NTS
WE ENGINEER SUCCESS
**HUNTSVILLE OPERATIONS**
7800 Highway 20 West
Huntsville, Alabama 35806
Phone (256) 837-4411
Fax (256) 721-0144
www.nts.com

# TEST REPORT

| | |
|---|---|
| **REPORT NO.:** | **T71379.01-01** |
| **NTS JOB NO.:** | **T71379.01** |
| **CLIENT P.O. NO.:** | **TA-037** |
| **CONTRACT:** | **N/A** |
| **TOTAL PAGES (including cover):** | **442** |
| **DATE:** | **April 28, 2014** |

## NATIONAL CERTIFICATION TEST REPORT
## FOR
## CERTIFICATION TESTING
## OF THE
## ELECTION SYSTEMS & SOFTWARE
## EVS 5.2.0.0 VOTING SYSTEM

**For**

**Election Systems & Software, LLC**
**11208 John Galt Blvd.**
**Omaha, NE 68137-2364**

**STATE OF ALABAMA**
**COUNTY OF MADISON** }

Robert D. Hardy, Department Manager, being duly sworn, deposes and says: The information contained in this report is the result of complete and carefully conducted testing and is to the best of his knowledge true and correct in all respects.

Robert D. Hardy

SEAL

SUBSCRIBED and sworn to before me this 28 day of April 20 14

Sandra A. Kinnel
Notary Public in and for the State of Alabama at Large

My Commission expires June 2, 2015

NTS Huntsville shall have no liability for damages of any kind to person or property, including special or consequential damages, resulting from NTS Huntsville providing the services covered by this report.

**PREPARED BY:** Stephen Han 4/28/14
Stephen Han, Project Engineer — Date

**APPROVED BY:** Michael L Walker 4/28/14
For Frank Padilla, Voting Systems Manager — Date

**NTS Q. A.:** Brenda Mauer 4/28/14
Per Rick Davis, Q. A. Manager — Date

NVLAP®
NVLAP LAB CODE 200771-0

U.S. Election Assistance Commission
VSTL
EAC Lab Code 0704

| NTS WE ENGINEER SUCCESS HUNTSVILLE OPERATIONS | | | **REVISION:** Original Submission |
|---|---|---|---|
| | | | **REPORT NO.** T71379.01-01 |
| | | | **DATE:** April 28, 2014 |
| **REV** | **DATE** | **PAGE OR PARAGRAPH AFFECTED** | **DESCRIPTION OF CHANGES** |
| --- | 4-28-14 | Entire Document | Original Document Release |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# TABLE OF CONTENTS

**Page No.**

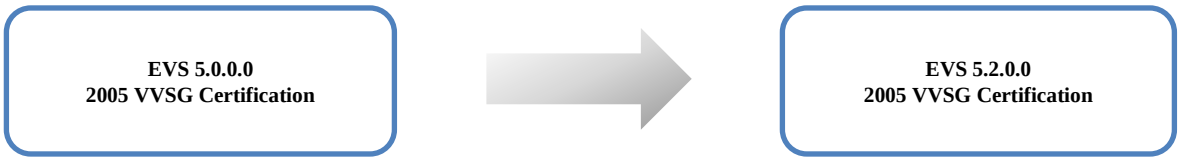
## TABLE OF CONTENTS (Continued)

**Page No.**

## APPENDICES

# 1.0 INTRODUCTION

EVS 5.2.0.0 was submitted for 2005 Voluntary Voting System Guidelines Standards Version 1.0 (2005 VVSG) certification. The modifications submitted were tested to the latest voting system standards, the 2005 Voluntary Voting System Guidelines (2005 VVSG), based on the requirements set forth in section 4.4.2.3 of the EAC Testing and Certification Program Manual.




## 1.1 Testing Scope

This report presents the procedures followed and the results obtained during certification testing of the Election Systems & Software (ES&S) EVS 5.2.0.0 Voting System. A previous version of this system, EVS 5.0.0.0, was granted certification under EAC Certification Number ESSEVS5000. Since that time, ES&S has incorporated modifications resulting in the release of EVS 5.2.0.0.

The primary purpose of certification testing was to determine whether the system complied with the requirements of the Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG). The primary purpose of this modification is to introduce the ExpressVote and the DS200 1.3 & 1.2.3 hardware versions into the previously certified EVS 5.0.0.0 voting system. In addition, ES&S submitted software changes to the DS200, DS850, AutoMARK, ElectionWare, and Election Reporting Manager (ERM).

The system changes submitted to the EAC in the Application for Certification (ESS1303) include functional and hardware modifications to the EMS, DS850, and DS200. Functional upgrades were made throughout this modification including software fixes, conformance with new RFIs released before application submission, software to enhance usability, replacement of hardware parts nearing end of life, and integration with the EVS suite to enhance usability and performance. These modifications are presented in their entirety in Appendix A.

## 1.2 Objective

The objective of this system modification test program was to ensure that EVS 5.2.0.0 complied with the hardware and software requirements of the EAC 2005 VVSG. The scope and detail of the requirements tested in the certification were selected to correspond to the scope of the system detailed in the application submitted by ES&S. An in-depth examination of the system further confirmed the applicable requirements selected for compliance testing. This included the inspection and evaluation of system documentation and the execution of functional tests to verify system performance and function under normal/abnormal conditions.

## 1.3 Test Report Overview

This test report consists of four main sections and appendices:

- 1.0 Introduction – Provides: the architecture of the National Certification Test Report (hereafter referred to as Test Report), a brief overview of the testing scope of the Test Report, a list of documentation, customer information, and references applicable to the voting system hardware, software, and this test report.

## 1.0 INTRODUCTION (Continued)

### 1.3 Test Report Overview (Continued)

- 2.0 System Identification – Provides information about the system tested that includes the system name and major subsystems, test support hardware, and specific documentation provided by the vendor used to support testing.
- 3.0 Test Background – Contains information about the certification test process and a list of terms and nomenclature pertinent to the Test Report and system tested.
- 4.0 Test Procedures and Results – Provides a summary of the results of the testing process.
- Appendices– Information supporting reviews and testing of the voting system.

### 1.4 Customer

Election Systems & Software, LLC
11208 John Galt Blvd.
Omaha, NE 68137-2364

### 1.5 References

The documents listed were utilized to perform testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines," and Volume II, Version 1.0, "National Certification Testing Guidelines", dated December 2005
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date June 1, 2011
- Election Assistance Commission Voting System Test laboratory Program Manual, Version 1.0, expires November 2014
- 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 5
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- EAC Requests for Interpretation and Notices of Clarification (listed on www.eac.gov)

## 1.0 INTRODUCTION (Continued)

### 1.5 References (Continued)

- EAC Quality Monitoring Program residing on:

  http://www.eac.gov/testing_and_certification/quality_monitoring_program.aspx

- Wyle Test Report No. T71013.02-01 – Hardware Compliance Testing of Election Systems and Software FL EVS 4.5.0.0 ExpressVote Hardware Version 1.0
- Wyle Test Report No. T71013.01-01 – Hardware Compliance Testing of Election Systems and Software FL EVS 4.5.0.0 DS200 Hardware Version 1.3
- Wyle Test Report No. T59087.01-01 Rev A – National Certification Test Report of Election Systems and Software EVS 5.0.0.0

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW

### 2.1 System Overview

The ES&S EVS 5.2.0.0 Voting System is a paper-based, digital scan voting system. The EVS 5.2.0.0 Voting System hardware consists of six major components:

1. Election Management System (EMS) Server
2. Election Management System (EMS) client (desktop and/or laptop) with Election Reporting Manager (ERM)
3. Polling Place American Disability Act (ADA) and Universal Vote Capture Device – ExpressVote
4. Polling Place Scanner – DS200
5. Polling Place American Disability Act (ADA) Devices – AutoMARK A100, AutoMARK A200, and AutoMARK A300
6. Central Count Digital Scanner – DS850

The following paragraphs describe the design and structure of the EVS 5.2.0.0 Voting System as taken from the ES&S Technical Documentation.

(The remainder of this page intentionally left blank)

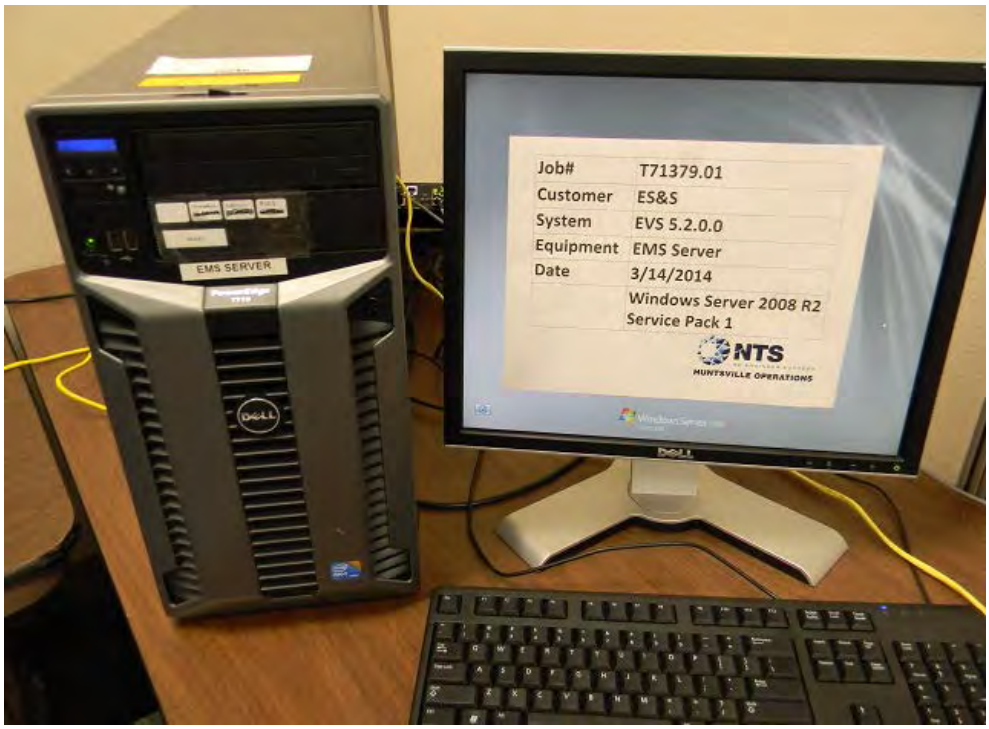
## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.1 System Hardware

**EMS Client Server Configuration**

EVS 5.2.0.0 Voting System Election Management System (EMS) was configured with a Server running Windows Server 2008 R2 with Service Pack 1 (SP1), and a combination of a client laptop and a client desktop running Windows 7 Professional SP1.



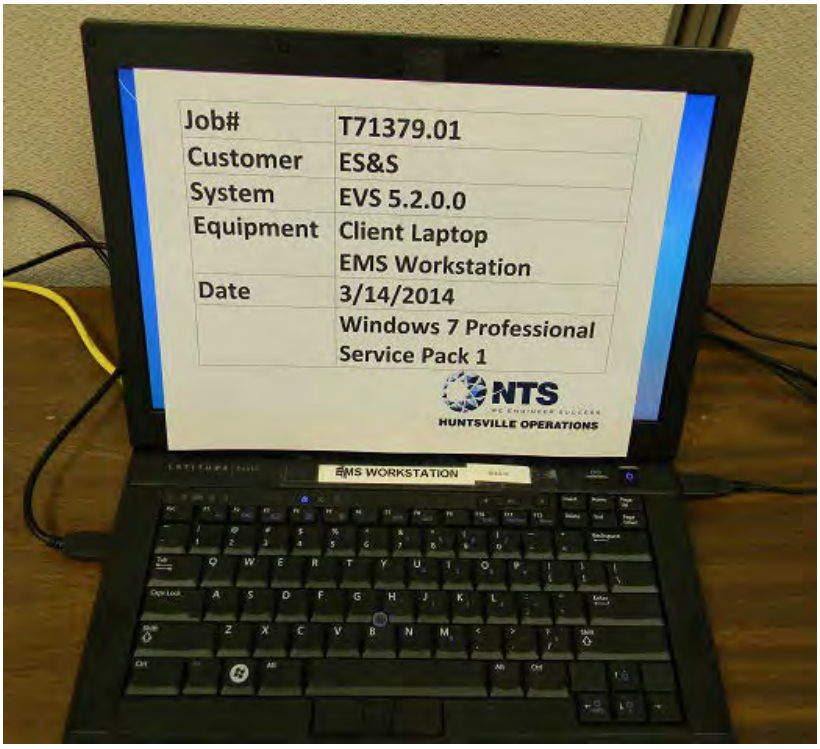

**Photograph No. 1: EMS Server**

(The remainder of this page intentionally left blank)

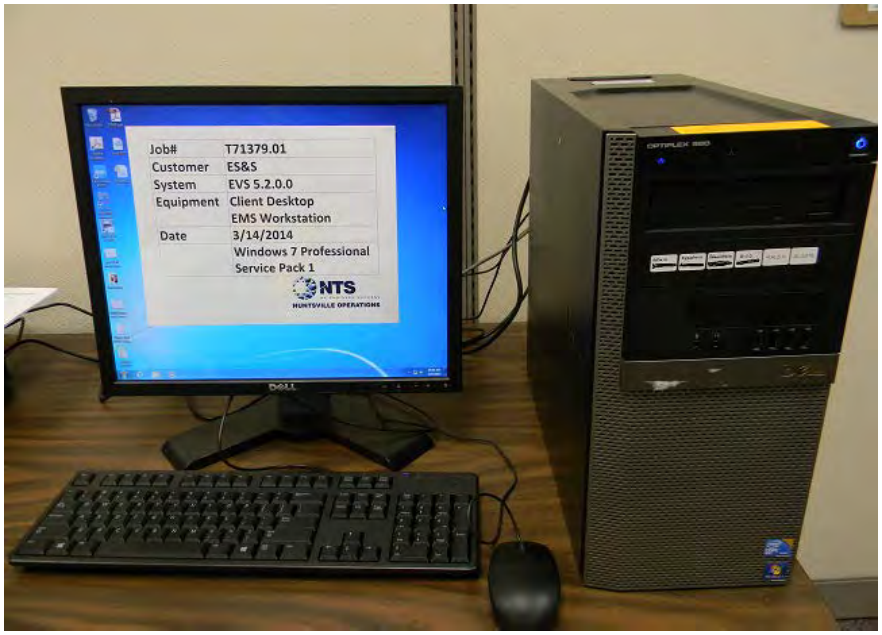
## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.1 System Hardware (Continued)




**Photograph No. 2: EMS Client Laptop**




**Photograph No. 3: EMS Client Desktop**

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.1 System Hardware (Continued)

**ExpressVote Vote Capture Device**

The ExpressVote is a universal vote capture device with an independent voter-verifiable paper record that is digitally scanned for tabulation by the DS200 or the DS850. This system combines paper-based voting with touch screen technology. The ExpressVote includes a mandatory vote summary screen that requires voters to confirm or revise selections prior to printing the summary of ballot selections using the internal thermal printer. Once printed, ES&S ballot scanners process the vote summary card. The ExpressVote can serve all voters, including those with special needs, allowing voters to cast ballots autonomously. ES&S has fully integrated the ExpressVote with the existing suite of ES&S voting system products.


**Photograph No. 4: ExpressVote**

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.1 System Hardware (Continued)

**Precinct Ballot Tabulator: DS200**

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

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


**Photograph No. 5: DS200 (on plastic ballot box)**

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.1 System Hardware (Continued)


**Photograph No. 6: DS200 (on metal ballot box)**

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.1 System Hardware (Continued)

**Electronic Ballot Marking Device: AutoMARK Voter Assist Terminal (VAT)**

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

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

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

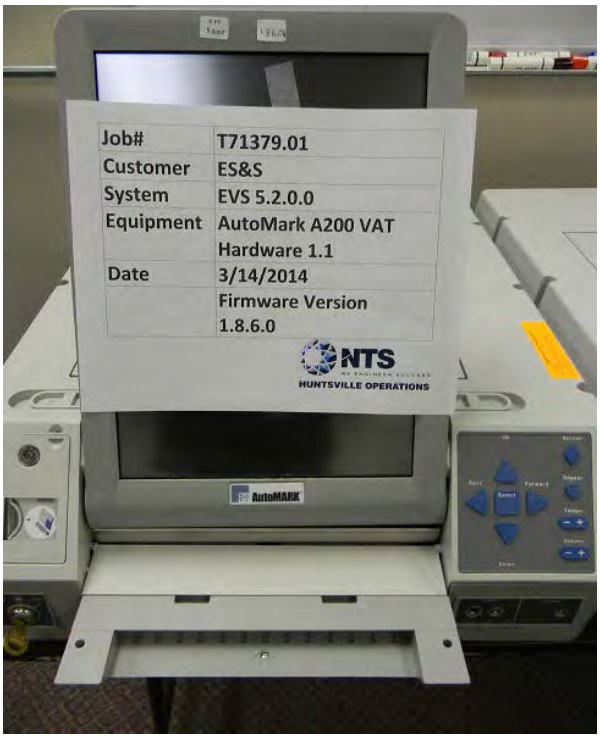
The A100, A200 and A300 all operate the same and have the same features. The difference between the models is the location of two printed circuit boards and related wiring harness and cables. In the A200, the Printer Engine Board and Power Supply Board were moved from under the machine to the top. The A300 has a different lock and label. Based on no functionality difference between the A200 and A300, the A200 equipment was only tested during system integration. Therefore, the A100, A200, and A300 are all included in the recommendation for certification.


**Photograph No. 7: AutoMARK A100 VAT**

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.1 System Hardware (Continued)




**Photograph No. 8: AutoMARK A200 VAT**

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.1 System Hardware (Continued)

**Tabulator: DS850**

The DS850 is a high-speed, digital scan central ballot counter. During scanning, the DS850 prints a continuous audit log to a dedicated audit log printer and can print results directly from the scanner to a second connected printer. The scanner saves results internally and to results collection media that officials can use to format and print results from a PC running Election Reporting Manager. The DS850 has an optimum throughput rate of 300 ballots per minute and uses cameras and imaging algorithms to image the front and back of a ballot, evaluate the results and sort ballots into discrete bins to maintain continuous scanning.


**Photograph No. 9: DS850**

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

### 2.1.2 System Software

The EVS 5.2.0.0 Voting System EMS is an application suite comprised of six components: Election Reporting Manager (ERM), ElectionWare, ES&S Event Logging Service (UELS), ExpressVote Previewer, Removable Media Service (RMS), and VAT Previewer.

**Election Reporting Manager (ERM)**

Election Reporting Manager (ERM) generates paper and electronic reports for election workers, candidates, and the media. Jurisdictions can use a separate ERM installation to display updated election totals on a monitor as ballot data is tabulated, and send the results' reports directly to the media outlets.

ERM supports accumulation and combination of ballot results data from all ES&S tabulators. Precinct and accumulated total reports provide a means to accommodate candidate and media requests for totals and are available upon demand. High-speed printers are configured as part of the system accumulation/reporting stations PC and related software.

**ElectionWare**

ElectionWare integrates the election administration functionality into a unified application. Its intended use is to define an election and create the resultant media files used by the ExpressVote Universal Vote Capture Device, DS200 Tabulator, AutoMARK Voter Assist Terminal (VAT), the DS850 Central Ballot Scanner, and Election Reporting Manager (ERM). An integrated ballot viewer allows election officials to view the scanned ballot and captured ballot data side-by-side and produce ballot reports.

**ES&S Event Logging Service (UELS)**

ES&S Event Logging Service leverages the Windows Event Viewer, included with a standard Windows installation, to audit user interactions with the ES&S Election Management System.

**ExpressVote Previewer**

The ExpressVote Previewer is an application within the EMS program that allows the user to preview audio text and screen layout prior to burning Election Day media for the ExpressVote.

**Removable Media Service (RMS)**

Removable Media Service (RMS) is an application that runs in the background of the EMS client workstation and supports the insertion and removal of election and results USB media.

**VAT Previewer**

The VAT Previewer is an application within the EMS program that allows the user to preview audio text and screen layout prior to burning Election Day media for the AutoMARK.

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.1 System Overview (Continued)

#### 2.1.3 System Operational Concept

The operational flow and low-level system interfaces for the EVS 5.2.0.0 Voting System is illustrated in Figure 1-1.

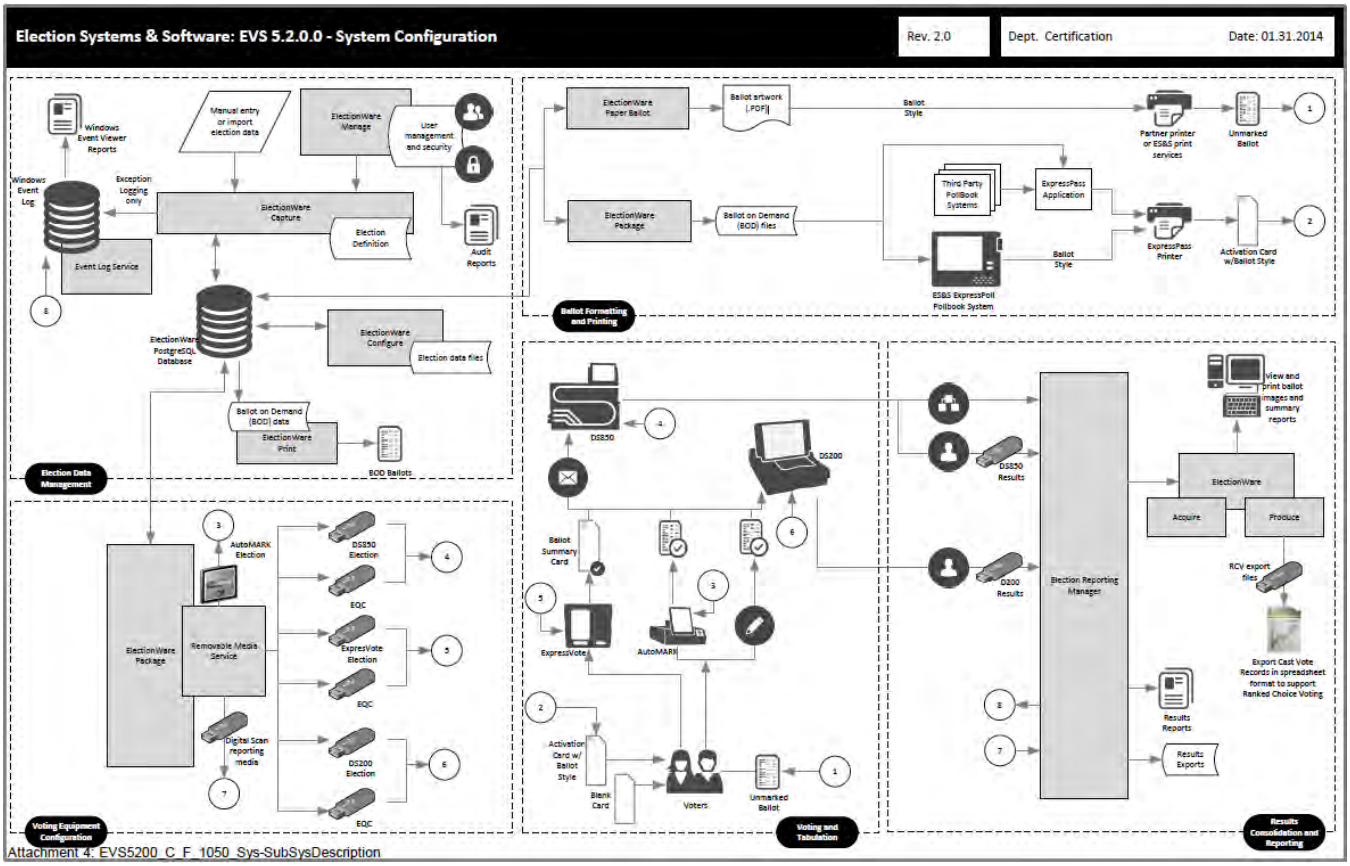



**Figure 1-1 System Overview Diagram**

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.2 Software

This section defines the two types of software required for testing: software used for the testing of hardware, software, security and system integration; and supporting software required for the test environment (operating systems, compliers, assemblers, database managers, and any other supporting software). All COTS third-party software was downloaded or retrieved by NTS Huntsville qualified personnel. These products were verified not to have been modified and were built into the EVS 5.2.0.0 for the entire test campaign. NTS Huntsville believes these components to have proven performance in other commercial applications. Both COTS and non-COTS software components are listed in this section.

**Table 2-1 EVS 5.2.0.0 EMS Software Platform Component Descriptions**

| Software Required For Testing | Software Version |
|---|---|
| ElectionWare | 4.6.0.0 |
| Election Reporting Manager (ERM) | 8.11.0.0 |
| ES&S Event Logging Service (ELS) | 1.5.5.0 |
| ExpressVote Previewer | 1.4.0.0 |
| ExpressPass Application* | 1.1.0.0 |
| Removable Media Service (RMS) | 1.4.5.0 |
| VAT Previewer | 1.8.6.0 |

*ExpressPass Application software is not in the scope of certification, but NTS reviewed the source code for 2005 VVSG compliance.

**Table 2-2 EVS 5.2.0.0 EMS COTS Software Platform Component Descriptions**

| Software Required For Testing | Description |
|---|---|
| Windows 7 Professional, with SP1 | Original Disk |
| Windows Server 2008 R2, with SP1 | Original Disk |
| Adobe Acrobat Standard version XI | Original Disk |
| RM/Cobol | 12.06 |
| Cerberus FTP | 6.0.7.1 |
| Symantec Endpoint Protection Small Business Edition 2013 | 12.1.4 |

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.3 Hardware

The system submitted by ES&S for certification testing consisted of the following hardware, firmware, and software source code components.

**Table 2-3 EVS 5.2.0.0 Voting System EMS Description**

| Equipment | Manufacturer | Version/Model | Specifications | Serial Number |
|---|---|---|---|---|
| EMS Client Laptop | Dell | Latitude E6410 | Intel Core i5 CPU M580 @ 2.67GHz<br>4.00 GB Installed RAM<br>HD Capacity 250 GB | 2FD65Q1 |
| EMS Server | Dell | T710 | Intel Xeon CPU E5645 @ 2.40GHz (2 processors),<br>12.0 GB Installed RAM<br>HD Capacity 300 GB | JPZ6VR1 |
| EMS Client Desktop | Dell | OptiPlex 980 | Intel Core i5 CPU 650 @ 3.20 GHz<br>4.0 GB Installed RAM<br>HD Capacity 320 GB | 3TZJFQ1 |

**Table 2-4 EVS 5.2.0.0 Build Machine Description**

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

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.3 Hardware

**Table 2-5 EVS 5.2.0.0 Voting System Equipment**

| Equipment | Description | Serial Numbers |
|---|---|---|
| ExpressVote Hardware Version 1.0 | Vote Capture Device | EV0113350021, EV0113350022 EV0113350025, EV0113350037 EV0113350052, EV0113350033, EV0113350049 |
| DS200 Hardware Version 1.2.1 | Precinct Count Digital Scanner | ES0108340026, DS0113340087 |
| DS200 Hardware Version 1.2.3 | Precinct Count Digital Scanner | DS0113360186 |
| DS200 Hardware Version 1.3 | Precinct Count Digital Scanner | DS0313350002, DS0313350010 |
| AutoMARK A100 Hardware Version 1.0 | Accessible Voting Station | AM0106431607 |
| AutoMARK A200 Hardware Version 1.1 | Accessible Voting Station | AM0308421809 |
| DS850 Hardware Version 1.0 | Central Count Digital Scanner | DS850: DS8511090075<br>Cart: 549037-01<br>Laser Printer Oki B430dn: AL03021036A0<br>UPS APC-RS 1500: JB1103003923<br>Dot Matrix Printer Oki 420: AE72011853C0 |
| Ballot Box Hardware v. 1.2 and 1.3 | Plastic Ballot Box | Box1; Box 2; Box 3; Box 4; Box 5; Box 01; Box 02; E089; E099 |
| Ballot Box Hardware v. 1.0, 1.1, & 1.2 | Metal Box with Diverter | Box 12 |
| Report Printer | OKI B6300 | USQX074394 |
| Headphones | Avid FV 60 | HP-57936-1- 9 |
| ExpressPass Printer* | Thermal Bar Code Printer | Model 4200<br>S/N: 01901042505 |
| Quick Response (QR) Code Scanner | Motorola QR Code Scanner | Model DS9208<br>S/N: 14014000502091 |
| Transport Media (USB Flash Drives) | Delkin 1GB<br>Delkin 2 GB<br>Delkin 4GB<br>Delkin 8GB | NTS-assigned: TM-XXX |
| Compact Flash | Delkin Devices 1 GB Compact Flash | NTS-assigned: CF-XXX |

*This equipment is not in the scope of certification. This equipment was tested to ensure that it functions as stated in the TDP. No other testing was performed on this equipment.

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.4 Test Tools/Materials

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

The following test materials are required to support the EVS 5.2.0.0 certification testing:

**Table 2-6 Test Support Materials**

| Test Material | Quantity | Make | Model |
|---|---|---|---|
| Ballot on Demand Printer | 1 | OKI Data | C9650 |
| ExpressPass Printer | 1 | Microcom | 4200 |
| QR Code Scanner | 1 | Motorola | DS9208 |
| 8 ½" X 11" Paper in Speed Loading Box (2700 Sheets) | 4 | Dot Matrix | 951027 |
| Security Seals | 5000 | Intab | 800-0038R |
| Security Locks | 20 | E. J. Brooks | 86022 |
| | 25 | E. J. Brooks | 6024 |
| | 50 | American Casting Corp. | 00561-03 |
| ES&S Pens | 20 | BIC | Grip Roller |
| Ethernet Switch | 1 | Dell | HNC67M1 |
| Security Sleeves | 7 | ES&S | PS-S7-936 |
| CF Card Reader | 1 | SanDisk | 018-6305 |
| Magnifier | 3 | --- | --- |
| Blue Security Ballot Storage/Transport Box | 2 | --- | --- |
| Headphone Covers | 30 | --- | --- |
| Paddles (yes/no) | 3 | --- | --- |

### 2.5 Vendor Technical Data Package

The Technical Data Package (TDP) contains information about requirements, design, configuration management, quality assurance, and system operations. The EAC 2005 VVSG requirements state that, at a minimum, the TDP shall contain the following documentation: system configuration overview; system functionality description; system hardware specifications; software design and specifications; system test and verification specifications; system security specifications; user/system operations procedures; system maintenance procedures; personnel deployment and training requirements; configuration management plan; quality assurance program; and system change notes.

The documents listed in Table 2-7 comprise the EVS 5.2.0.0 Voting System TDP:

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.5 Vendor Technical Data Package (Continued)

**Table 2-7 EVS 5.2.0.0 Voting System TDP**

| EVS 5.2.0.0 TDP Documents | Version | Doc No. | Document Code |
|---|---|---|---|
| ***System Overview*** | | | |
| Voting System Overview | 9.0 | 01-01 | EVS5200_C_D_0100_SysOvr |
| ***System Functionality Description*** | | | |
| System Functionality Description – Voting System | 6.0 | 02-01 | EVS5200_C_D_0200_SFD |
| ***System Hardware Specification*** | | | |
| System Hardware Specification – DS200 Hardware Revision 1.2 | 3.0 | 03-01 | DS200HW_M_SPC_0312_HWSpec |
| System Hardware Specification – DS200 Hardware Revision 1.3 | 4.0 | 03-02 | DS200HW_M_SPC_0313_HWSpec |
| System Hardware Specification – DS850 | 1.1 | 03-03 | DS850HW_M_SPC_0310_HWSpec |
| ExpressVote Hardware Specification | 3.0 | 03-04 | ExpressVoteHW_M_SPC_0310_HWSpec |
| AutoMARK System Hardware Overview | 3.0 | 03-05-01 | AutoMARK_ESS_System_Hardware_ Overview_AQS-18-5002-000-S |
| AutoMARK System Hardware Specification | 3.0 | 03-05-02 | AutoMARK_ESS_System_Hardware_ Specification_AQS-18-5000-001-F |
| ***Software Design and Specification*** | | | |
| Software Design and Specification – ES&S Event Log Service | 1.0 | 04-01 | EVS5200_SDS00_ELS |
| Software Design and Specification - ElectionWare | 2.0 | 04-02 | EVS5200_SDS00_ElectionWare |
| Software Design and Specification – ERM | 2.0 | 04-03 | EVS5200_SDS00_ERM |
| ES&S Software Design Specifications ERM Appendices | 2.0 | 04-03-01 | EVS5200_SDS00_ERM01_Appendices |
| Software Design and Specification – DS850 | 2.0 | 04-04 | EVS5200_SDS00_DS850 |
| DS200 Software Design and Specification | 4.0 | 04-05 | EVS5200_D_SDS00_DS200 |
| ExpressVote Software Design and Specification | 3.0 | 04-06 | EVS5200_D_SDS00_ExpressVote |
| Software Design and Specification – AutoMARK | 1.8 | 04-07 | AutoMARK ESS Software Design Specifications Overview |
| AutoMARK Operating Software Design Specifications | 5.0 | 04-07-01 | AQS-18-5001-002-R |
| AutoMARK Ballot processing Specifications | 3.0 | 04-07-01 | AQS-18-5002-003-S |
| AutoMARK Software Design Specifications | 5.0 | 04-07-01 | AQS-18-5001-004-S |
| AutoMARK Software Development Environment | 5.0 | 04-07-01 | AQS-18-5001-006-R |
| AutoMARK Graphical User Interface Specifications | 6.0 | 04-07-01 | AQS-18-5001-005-R |
| AutoMARK Software Diagnostics Specifications | 5.0 | 04-07-01 | AQS-18-5000-004-F |
| AutoMARK Embedded Database Interface Specifications | 5.0 | 04-07-01 | AQS-18-5002-005-S |
| AutoMARK Ballot Scanning and Printing Specifications | 5.0 | 04-07-01 | AQS-18-5002-007-S |
| AutoMARK Driver API Specifications | 5.0 | 04-07-01 | AQS-18-5000-002-F |
| AutoMARK Programming Specifications Details | 5.0 | 04-07-01 | AQS-18-5001-011-R |
| AutoMARK ESS Software Standards Specification | 5.0 | 04-07-01 | AQS-18-4000-000-S |
| AutoMARK ESS Operations and Diagnostic Log Specs | 5.0 | 04-07-01 | AQS-18-5002-004-S |
| ES&S System Development Program | 2.0 | 04-08 | ESSSYS_SG_P_0400_ SystemDevProgram |
| Coding Standards | 3.0 | 04-09 | ESSSYS_D_P_0400_CodingStandards |

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.5 Vendor Technical Data Package (Continued)

**Table 2-7 EVS 5.2.0.0 Voting System TDP (Continued)**

| EVS 5.2.0.0 TDP Documents | Version | Doc No. | Document Code |
|---|---|---|---|
| ***System Test/Verification Specification*** | | | |
| Voting System Test Plan<br>ES&S Voting System 5.2.0.0 | 2.0 | 05-01 | EVS5200_QA_D_0500_SysTestPlan |
| CIF Usability Test Reports – ExpressVote | 1.0 | 05-02-01 | ExpressVoteHW_P_D_0509_<br>CIFRptExpressVote |
| CIF Usability Test Reports – AutoMARK | 1.x | 05-02-02 | AMVATHW_P_D_0510_CIFRptAMVAT |
| CIF Usability Test Reports – DS200 | 1.2.1 | 05-02-03 | DS200HW_P_D_0512_CIFRptDS200 |
| ***System Security Specification*** | | | |
| Voting System Security Specification | 4.0 | 06-01 | EVS5200_CM_SPC00_SysSecuritySpec |
| Hardening Procedures for the Election System | 1.2 | 06-02 | EVS5200_CM_SPC01_<br>HardeningProcedures |
| Security Script Description | 1.1 | 06-03 | EVS5200_CM_SPC02_SecScriptDesc |
| AutoMARK System Security Specifications | 6.0 | 06-04 | AutoMARK ESS System Security<br>Specification AQS-18-5002-001-S |
| ***System Operations Procedure*** | | | |
| Network Setup Guide | 1.2 | 07-01 | EVS5200_CM_SOP_<br>NetworkConfigGuide |
| AutoMARK System Operator's Guide | 4.0 | 07-02 | EVS5200_DOC_SOP_AMVAT |
| DS200 Operator's Guide | 6.00 | 07-03 | EVS5200_DOC_SOP_DS200 |
| DS850 Operator's Guide | 4.0 | 07-04 | EVS5200_DOC_SOP_DS850 |
| EVS Event Logging Service | 3.0 | 07-05 | EVS5200_DOC_SOP_ELS |
| Election Reporting Manager User's Guide | 7.0 | 07-06 | EVS5200_DOC_SOP_ERM |
| ElectionWare Volume I: Administrator's Guide | 4.0 | 07-07 | EVS5200_DOC_SOP_EW01Admin |
| ElectionWare Volume II: Define User's Guide | 5.0 | 07-08 | EVS5200_DOC_SOP_EW02Define |
| ElectionWare Volume III: Design User's Guide | 3.0 | 07-09 | EVS5200_DOC_SOP_EW03Design |
| ElectionWare Volume IV: Deliver User's Guide | 4.0 | 07-10 | EVS5200_DOC_SOP_EW04Deliver |
| ElectionWare Volume V: Results User's Guide | 3.0 | 07-11 | EVS5200_DOC_SOP_EW05Results |
| ExpressPass Operator's Guide | 4.0 | 07-12 | EVS5200_DOC_SOP_ExpressPass |
| ExpressVote Operator's Guide | 4.0 | 07-13 | EVS5200_DOC_SOP_ExpressVote |
| ***System Maintenance Manuals*** | | | |
| AutoMARK System Maintenance Manual | 2.1 | 08-01 | EVS5200_DOC_SMM_AMVAT |
| DS200 Maintenance Guide | 2.0 | 08-02 | EVS5200_DOC_SMM_DS200 |
| DS850 Maintenance Guide | 3.0 | 08-03 | EVS5200_DOC_SMM_DS850 |
| ExpressVote Maintenance Guide | 2.3 | 08-04 | EVS5200_DOC_SMM_ExpressVote |
| ***Personnel Deployment and Training*** | | | |
| Personnel Deployment and Training Program | 3.0 | 09-01 | ESSSYS_T_D_0900_TrainingProgram |
| ***Configuration Management Plan*** | | | |
| Configuration Management Plan | 2.0 | 10-1 | ESSSYS_CM_P_1000_CMProgram |
| ES&S Technical Documentation Program | 5.0 | 10-2 | ESSSYS_DOC_P_1000_TDProgram |

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.5 Vendor Technical Data Package (Continued)

**Table 2-7 EVS 5.2.0.0 Voting System TDP (Continued)**

| EVS 5.2.0.0 TDP Documents | Version | Doc No. | Document Code |
|---|---|---|---|
| ***QA Program*** | | | |
| Manufacturing Quality Assurance Plan | 2.0 | 11-01 | ESSSYS_M_P_1100_MNFQuality AssurancePlan |
| ES&S 1.3 Hardware DS200 Acceptance Checklist | A | 11-01-01 | 1 3 Hardware DS200_AccptChklst_001RevA |
| DS850 Acceptance checklist | D | 11-01-01 | 850_AccptChklst_revD |
| DS850 Onsite Acceptance Checklist | B | 11-01-01 | 850_OAccptChklst_revB |
| Acceptance Checklist AutoMARK Voter Assist Terminal | A | 11-01-01 | AutoMARK_AccptChklst_001_Rev.A |
| AutoMARK QC Checklist | A | 11-01-01 | AutoMARK_QC_Chklst_001Rev.A |
| ES&S DS200 Acceptance Checklist | D | 11-01-01 | DS200_AccptChklst_001RevD |
| ES&S ExpressVote Acceptance Checklist | B | 11-01-01 | ExpressVote_AccptChcklst_001Rev B |
| Software Quality Assurance Program | 2.0 | 11-02 | ESSSYS_QA_P_1100_SoftwareQuality AssuranceProgram |
| ES&S Software/Firmware Acceptance | 2.0 | 11-02-01 | ESSSYS_QA_L_1100_SoftwareFirmware Acceptance |
| ***System Change Notes*** | | | |
| System Change Notes | 10.0 | 12-01 | EVS5200_DOC_D_1200_ChangeNotes |
| ***Other TDP Documents*** | | | |
| ES&S Ballot Production Guide | 2.1 | 13-01 | EVS5200_DOC_SOP_11_BPG |

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.6 Deliverable Materials

The materials listed on Table 2-8 are identified by ES&S to be delivered as part of the EVS 5.2.0.0 Voting System to the end users.

**Table 2-8 EVS 5.2.0.0 Voting System Deliverables**

| Deliverable Material | Version | Description |
|---|---|---|
| ExpressVote | Firmware 1.4.0.0; Hardware 1.0 | Vote Capture Device |
| 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 |
| QR Code Scanner | Motorola Model DS9208 | Bar code scanner |
| ElectionWare | 4.6.0.0 | EMS |
| ERM | 8.11.0.0 | 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 Previewer | 1.4.0.0 | EMS |
| EVS 5.2.0.0 Voting System Overview | 9.0 | TDP Document |
| EVS 5.2.0.0 System Functionality Description | 6.0 | TDP Document |
| ES&S ElectionWare Volume I: Administrator's Guide | 3.0 | TDP Document |
| ES&S ElectionWare Volume II: Define User's Guide | 4.0 | TDP Document |
| ES&S ElectionWare Volume III: Design User's Guide | 2.0 | TDP Document |
| ES&S ElectionWare Volume IV: Deliver User's Guide | 4.0 | TDP Document |
| ES&S ElectionWare Volume V: Results User's Guide | 2.0 | TDP Document |
| Election Reporting Manager User's Guide | 7.0 | TDP Document |
| ExpressVote Operator's Guide | 4.0 | TDP Document |
| DS200 Operator's Guide | 6.0 | TDP Document |
| DS850 Operator's Guide | 4.0 | TDP Document |
| AutoMARK System Operator's Guide | 4.0 | TDP Document |
| EVS 5.2.0.0 Network Setup Guide | 1.1 | TDP Document |
| ES&S EVS Event Logging Service User's Guide | 3.0 | TDP Document |
| EVS 5.2.0.0 Voting System Security Specification | 4.0 | TDP Document |
| EVS 5.2.0.0 Hardening Procedures for the Election System | 1.2 | TDP Document |

## 3.0 TEST BACKGROUND

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 845.01, 845.02, and 845.03)
- FCC Approved Contractor Test Site (Part 15, 18)

### 3.1 General Information

All testing performed as part of this test effort was performed at the NTS Huntsville, AL facility. Qualification/Certification testing was limited to the ES&S EVS 5.2.0.0 Voting System components previously identified in this report.

All hardware used during testing for this test campaign was configured "as used" for voting. Each precinct tabulator was placed on a ballot box and loaded with the proper firmware. The central count components were loaded with the proper firmware. The AutoMARK ADA device and ExpressVote vote capture device were placed on the accessible voting table or within the ES&S ADA booth with peripherals and loaded with the proper firmware. The EVS 5.2.0.0 EMS suite was configured on COTS PCs. All media used during testing was loaded from these PCs. All hardware used to build the applicable software and firmware for this test campaign was configured by NTS Huntsville personnel.

### 3.2 Certification Testing Scope

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

- **Section 2: Functional Requirements** – The requirements in this section were tested during the FCA and System Integration test utilizing the "NTS Huntsville Baseline Test Cases" along with test cases specially designed for the ES&S EVS 5.2.0.0.
- **Section 3: Usability and Accessibility** – The requirements in this section were tested during the Usability Test, FCA, and System Integration test utilizing a combination of the "NTS Huntsville Baseline Test Cases" and the "NTS Huntsville Baseline Usability Test Cases."
- **Section 4: Hardware Requirements** – The requirements in this section were tested during the FL EVS 4.5.0.0 test campaign with the exception of Electrical Supply and Maintainability. The FL EVS 4.5.0.0 test campaign tested the ExpressVote and hardware modifications to the DS200. The FL EVS 4.5.0.0 Hardware Test Report Number T71013.01-01 and T71013.01-02 are presented in Appendix C as part of the approved Test Plan and request for reuse during this testing campaign. The requirements in this section were tested by trained NTS Huntsville personnel per sections 4.5 of this report.
- **Section 5: Software Requirements** – The requirements in this section were tested during source code review, TDP review, and FCA. A combination of review and functional testing was performed to ensure these requirements were met.

## 3.0 TEST BACKGROUND (Continued)

### 3.2 Certification Testing Scope (Continued)

- **Section 6: Telecommunication** – The requirements in this section were not tested during this test campaign.
- **Section 7: Security Requirements** – The requirements in this section were tested during source code review, FCA, System Integration, and Security Tests.
- **Section 8: Quality Assurance (QA) Requirements** – The QA requirements were spot checked and limited to only the changes included within this modification. The following documents were utilized during the limited review process:
    - ESSSYS_M_P_1100_MNFQualityAssurancePlan
    - ESSSYS_QA_P_1100_SoftwareQualityAssurance Program
- **Section 9: Configuration Management (CM) Requirements** – The CM requirements were spot checked and limited to only the changes included within this modification. The following documents were utilized during the limited review process:
    - ESSSYS_CM_P_1000_CMProgram
    - ESSSYS_DOC_P_1000_TDPProgram

The ES&S EVS 5.2.0.0 Voting System is a paper based precinct counting system. Therefore, all EAC 2005 VVSG requirements intended for DRE were excluded from this test campaign, as well as the following:

- Volume I Section 6 (Telecommunication Requirements)
- Volume I Section 7.5.2-7.5.4 (Telecommunications and Data Transmission)
- Volume I Section 7.6 (Use of Public Communication Networks)
- Volume I Section 7.7 (Wireless Communications)
- Volume I Section 7.9 (Voter Verifiable Paper Audit Trail Requirements)

The rationale for not evaluating the EVS 5.2.0.0 Voting System to the requirements contained in the indicated sections of the EAC 2005 VVSG is described in Table 3-1.

(The remainder of this page intentionally left blank)

## 3.0 TEST BACKGROUND (Continued)

### 3.2 Certification Testing Scope (Continued)

**Table 3-1 Not Applicable Requirements**

| EAC 2005 VVSG Volume I Section | Rationale for 'Not Applicable' |
|---|---|
| 6, 7.5.2-7.5.4 | These requirements are written for use on public networks. The ES&S EVS 5.2.0.0 Voting System does not use public networks. |
| 7.6 | This section pertains to "Voting systems that transmit data over public telecommunications…" The ES&S EVS 5.2.0.0 Voting System as configured for this certification does not permit transmission over public networks. |
| 7.7 | No wireless technology is present in ES&S EVS 5.2.0.0 Voting System. |
| 7.9 | The ES&S EVS 5.2.0.0 Voting System is a paper based system. |

### 3.3 Quality Assurance

All work performed on this test program was completed in accordance with NTS' Quality Program.

The NTS, Huntsville Facility, Quality Management System is registered in compliance with the ISO-9001:2008 International Quality Standard. Registration has been completed by SAI GLobal, a Division of Canadian Standards Association (CSA).

### 3.4 Test Equipment and Instrumentation

All instrumentation, measuring, and test equipment used in the performance of this test program was calibrated in accordance with NTS Huntsville Quality Assurance Program, which complies with the requirements of ANSI/NCSL 2540-1, ISO 10012-1, and ISO/IEC 17025. 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.

(The remainder of this page intentionally left blank)

## 3.0 TEST BACKGROUND (Continued)

### 3.5 Terms and Abbreviations

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

**Table 3-2 Terms and Abbreviations**

| Term | Abbreviation | Definition |
|---|---|---|
| Americans with Disabilities Act of 1990 | ADA | ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability. |
| Configuration Management | CM | --- |
| Commercial Off the Shelf | COTS | Commercial, readily available hardware or Software. |
| 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 Logging Service | ELS | --- |
| Election Management System | EMS | Within the EVS 5.2.0.0 Voting System, the EMS is comprised of seven components: ElectionWare, ERM, ES&S Event Logging Service, ExpressVote Previewer, RMS, and VAT Previewer. |
| Election Reporting Manager | ERM | EVS EMS reporting component. |
| Election Systems and Software | ES&S | --- |
| Equipment Under Test | EUT | Refers to the individual system component or multiple piece of the same component. |
| ES&S Voting System | EVS | --- |
| 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. |
| 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. |
| Quality Assurance | QA | -- |
| Regression Testing | --- | The process of examining and testing to verify that all functional and firmware modifications made during the test campaign did not introduce new errors or non-conformities into the voting system. |
| Removable Media Service | RMS | Application that runs in the background of the EMS client workstation. |

## 3.2 TEST BACKGROUND (Continued)

## 3.5 Terms and Abbreviations (Continued)

**Table 3-2 Terms and Abbreviations (Continued)**

| Term | Abbreviation | Definition |
|---|---|---|
| System Under Test | SUT | Refers to the system as a whole (all components). |
| Secure File Transfer Protocol | SFTP | A network protocol that provides file access, files transfer, and file management functionality over any reliable data stream. |
| 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". |
| Uninterruptible Power Supply | UPS | --- |
| Voter Assist Terminal | VAT | The electronic ballot marking device component is the ES&S AutoMARK. |
| Voluntary Voting System Guidelines | EAC 2005 VVSG | Published by the EAC, the third iteration of national level voting system standards. |
| National Technical Systems | NTS | --- |
| Operating Procedure | OP | Test Method or Test Procedure. |
| Voting System Test Laboratory | VSTL | NTS Huntsville. |
| Voluntary Voting System Guidelines | VVSG | EAC Voluntary Voting System Guidelines Version 1.0. |
| Quick Response Code | QR Code | Two-dimensional barcode |

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS

The ES&S EVS 5.2.0.0 Voting System, as identified in Section 2 of this report, was subjected to the tests summarized in the following paragraphs.

### 4.1 Source Code Review

As part of testing activities, the ES&S EVS 5.2.0.0 Voting System received a 100% manual review on all modified source code not written in Java for the EMS, DS200, AutoMARK, DS850, and ExpressVote. The source code was reviewed to the EAC 2005 VVSG coding standards and the manufacturer supplied coding standards. The manufacturer supplied coding standards (ESSSYS_D_P_0400_Coding Standards) can be found within the vendor provided TDP. The review was conducted per the guideline described in the following paragraph.

As the updated source code was received, a SHA256 hash value was created for each source code file. The source code team conducted a visual scan of every line of modified source code not written in Java. The source code team then conducted automated source code reviews using Eclipse and Checkstyle on the ElectionWare portion of source code written in Java. In addition to the automated source code review, NTS also performed a 10% manual review of the headers and quality of comments. This was done to identify any violation of EAC 2005 VVSG coding standards or manufacturer supplied coding standards. The COTS tools utilized by the source code group were Beyond Compare and Crimson Editor. Each identified violation was then recorded by making notes of the standards violation along with directory name, file name, and line number.

**Summary Findings**

Other than the coding standards noted in the technical summary reports, no other deficiencies or significant problems were found during the source code review. A technical summary report of all identified standards violations was sent to ES&S for resolution. ES&S then corrected all standards violations and re-submitted the source code for re-review. Notice of Anomaly (NOA) No. 4, documenting these discrepancies, is found in Appendix F of this report. During the source code review a total of 69 discrepancies were notated. Tables 4-1 and 4-2 below provide the discrepancies and count identified during the entire review process:

**Table 4-1 Source Code Discrepancies by type**

| | |
|---|---|
| Units Called | 26 |
| Header Return | 2 |
| Non Enumerated Constant | 6 |
| Header File References | 1 |
| Over 6 Levels Of Indenting | 2 |
| Line Too Long | 3 |
| Header or File Missing | 5 |
| Header Revision History | 10 |
| In-Line Comments | 1 |
| Header Return | 2 |
| Header Inputs and Outputs | 4 |
| Header Parameter | 2 |
| Object/Datatype/Variable Comment | 5 |
| Total: | 69 |

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.1 Source Code Review (Continued)

**Table 4-2 Source Code Review Breakdown**

| Source Code Component and Utilities | *Number of Reviews | *Number of Discrepancies |
|---|---|---|
| ElectionWare | 5 | 0 |
| ERM | 2 | 1 |
| Event Log Service | 1 | 0 |
| ExpressVote | 5 | 48 |
| Removable Media Service | 1 | 0 |
| DS200 | 4 | 14 |
| AutoMARK | 4 | 2 |
| DS850 | 5 | 4 |
| ExpressPass Application** | 3 | 0 |

***The number of reviews includes both initial submissions and subsequent reviews which may include clean versions of code where no discrepancies were identified.**
****ExpressPass Application software is not in the scope of certification, but NTS reviewed the source code for 2005 VVSG compliance.**

### 4.2 Trusted Build

A Trusted Build of the software was created using ES&S trusted build documents. The Trusted Build was performed by completing the following tasks in the order listed:

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

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.2 Trusted Build (Continued)

The Trusted Build for the ES&S EVS 5.2.0.0 includes source code, data, and script files, in clear text form. The build also includes COTS software on commercially available media, COTS software downloaded by the VSTL, COTS software verified by SHA256 from the software supplier, and picture and sound files in binary format provided by ES&S. The first step of the process was to clean the hard drives by writing data to every spot on the hard drive, so the drive is cleared of existing data. Microsoft Windows XP and Windows 7 Professional operating systems were then loaded and the applications from the VSTL reviewed source along with the VSTL verified COTS software was built. The final step was installing the applications on the hardware.

**Summary Findings**

NTS Huntsville performed a Trusted Build for each software component of the ES&S EVS 5.2.0.0 on April 14-16, 2014. ES&S Technical Representative for the Trusted Build was Dave Herrera. The products from the Trusted Build shall be supplied to the EAC as part of the certification effort.

### 4.3 Technical Data Package Review

The ES&S EVS 5.2.0.0 Technical Data Package (TDP) was reviewed to the 2005VVSG. This review was performed as part of the testing activities. The TDP review included only the documents that support the scope of certification for this testing campaign.

The TDP contains information about requirements, design, configuration management, quality assurance, and system operations. The EAC requirements state that, at a minimum, the TDP shall contain the following documentation: system configuration overview; system functionality description; system hardware specifications; software design and specifications; system test and verification specifications; system security specifications; user/system operations procedures; system maintenance procedures; personnel deployment and training requirements; configuration management plan; quality assurance program; and system change notes.

The TDP documents were reviewed for accuracy, completeness, and compliance to the VVSG. The TDP documentation served as the basis for design and development of the functional tests.

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.3 Technical Data Package Review (Continued)

**Summary Findings**

The review results were recorded in a worksheet that provided the pass/fail compliance to each applicable VVSG requirement. There were 47 discrepancies reported to ES&S and internally tracked by NTS Huntsville as test exceptions until verified that the applicable documents had been corrected. ES&S corrected nonconformance observations and resubmitted the associated documents for review. This process continued until the TDP complied with TDP Standards.

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 noted TDP issues were resolved prior to the conclusion of the review process. The Technical Data Package Review Report that summarizes the 47 discrepancies noted is included in Appendix E of this report. The Notice of Anomaly (NOA) No.3 documenting that TDP discrepancies were found is included in Appendix F of this report.

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.4 Hardware Testing

EVS 5.2.0.0 is comprised of four proprietary pieces of hardware; DS200, AutoMARK, DS850, and ExpressVote. Based on no hardware changes to the AutoMARK or DS850 these components were excluded from hardware testing during this campaign. The DS200 hardware version 1.3 and the ExpressVote were introduced during this testing campaign to the EVS system. NTS Huntsville performed hardware testing on the DS200 1.3 version and the ExpressVote as part of the FL EVS 4.5.0.0 campaign and the accepted tests are listed in table 4-3. NTS Huntsville performed Electrical Supply and Maintainability hardware testing on the DS200 version 1.3 and ExpressVote during the EVS 5.2.0.0 test campaign. NTS Huntsville also performed Acoustic testing on the ExpressVote as part of the EVS 5.2.0.0 campaign. NTS Huntsville determined the EMS computers that consist of COTS PCs and laptops are not subject to hardware testing per the EAC 2005 VVSG. The provided PCs and laptops documented in Section 3 Materials Required For Testing all contained CE, UL, and FCC labeling.

**Table 4-3 Hardware Test Examination Results**

| Test/EAC 2005 VVSG Section | Procedure/Description | EVS 5.2.0.0 DS200 HW 1.3 & ExpressVote HW 1.0 |
|---|---|---|
| *Electromagnetic Radiation/4.1.2.9* | FCC Part 15 Class B for both radiated and conducted emissions | Accept FL EVS 4.5.0.0 |
| *Low Temperature/4.1.2.14* | MIL-STD-810D minimum temperature shall be -4°F | Accept FL EVS 4.5.0.0 |
| *Vibration/4.1.2.14* | MIL-STD-810D, Method 514.3 physical shock and vibration during handling and transport | Accept FL EVS 4.5.0.0 |
| *Lightning Surge/4.1.2.7* | IEC 61000-4-5 (1995-02) | Accept FL EVS 4.5.0.0 |
| *High Temperature/4.1.2.14* | MIL-STD-810D, Method 501.2 maximum temperature shall be 140°F | Accept FL EVS 4.5.0.0 |
| *Bench Handling* | MIL-STD-810D, Method 516.3 Procedure VI six 4” drops on each edge totaling 24 drops | Accept FL EVS 4.5.0.0 |
| *Electrical Fast Transient/4.1.2.6* | IEC 61000-4-4 (2004) | Accept FL EVS 4.5.0.0 |
| *Humidity Test/4.1.2.14* | MIL-STD-810D, Method 501.2 ten 24 hour humidity cycles | Accept FL EVS 4.5.0.0 |
| *Electrostatic Disruption/4.1.2.8* | IEC 61000-4-2 (1995-01) 15kV air discharge and 8kV contact discharge | Accept FL EVS 4.5.0.0 |
| *Electromagnetic Susceptibility/4.1.2.10* | IEC 61000-4-3 (2006) electromagnetic field of 10V/m modulated by a 1kHZ, 80% AM modulation at 80MHz to 1000MHz frequency | Accept FL EVS 4.5.0.0 |
| *Conducted RF Immunity/4.1.2.11* | IEC 61000-4-6 (1996-04) conducted radio frequency energy | Accept FL EVS 4.5.0.0 |
| *Magnetic Fields Immunity/4.1.2.12* | IEC 61000-4-8 (1993-06) AC magnetic fields of 30 A/m at 60Hz | Accept FL EVS 4.5.0.0 |
| *Electrical Power Disturbance/4.1.2.5* | IEC 61000-4-11 (1994-06) power surges and dips | Accept FL EVS 4.5.0.0 |
| *Temperature/Power Variation/4.1.2.13* | MIL-STD-810D, Method 502.2 and Method 501.2 163 hours at 50°F to 95°F | Accept FL EVS 4.5.0.0 |
| *Safety/4.3.8* | UL 60950-1 product safety review | Accept FL EVS 4.5.0.0 |

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.4.1 Acoustic Noise Level Test

The ExpressVote was subjected to an Acoustic Noise Level Test to satisfy the following requirements of Sections 3.17.1 and 3.2.2.2 (c) of Volume I of the 2005 VVSG:

**Summary Findings**

During the Acoustic Noise Level Test, there was one discrepancy recorded. Refer to Notice of Anomaly (NOA) No. 2 presented in Appendix F for further details. The test was repeated and the ExpressVote successfully met the requirements of the Acoustic Noise Level Test.

### 4.4.2 Electrical Supply Testing

Electrical Supply Testing was performed in accordance with Section 4.1.2.4 of Volume I of the VVSG. This test was performed to ensure that the DS200 hardware version 1.3 and ExpressVote will continue to provide the capability for any voter who is voting at the time of a failure of the main power supply external to the voting system to complete the casting of a ballot. Additionally, it is 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 has reverted to back-up power.

To perform the test, the EUT was configured as for normal operation. The EUT was then operated as designed for fifteen minutes prior to the removal of the AC input power. Once AC power was interrupted, the DS200 and ExpressVote were continuously operated for a minimum period of two hours until backup power was exhausted. Following the exhaustion of backup power, the AC power was restored and the system was operated for an additional fifteen minutes.

**Summary Findings**

The DS200 hardware version 1.3 and the ExpressVote successfully completed the requirements of the Electrical Supply Test.

### 4.4.3 Maintainability

Maintainability Testing was performed in accordance with Section 4.7.2 of Volume II of the VVSG. This test was performed to evaluate the ease with which preventive and corrective maintenance actions can be performed based on the design characteristics of equipment and software and the processes the vendor and election officials have in place for preventing failures and for reacting to failures. It includes the ability of equipment and software to self-diagnose problems and make non-technical election workers aware of a problem and addresses all scheduled and unscheduled events which are performed to determine operational status and make component adjustments or repairs.

The DS200 hardware version 1.3 and ExpressVote were evaluated with the appropriate vendor documentation, and maintainability was determined based on the presence of specific physical attributes that aid system maintenance activities, and the ease with which system maintenance tasks were able to be performed.

**Summary Findings**

The DS200 hardware version 1.3 and the ExpressVote successfully completed the requirements of the Maintainability Test.

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing

System Level Testing was performed to evaluate the integrated operation of the voting system hardware and software. The suite of tests that comprise the System level Testing includes: Volume and Stress Test, System Integration Test, Security Test, Usability and Accessibility Tests, Data Accuracy, as well as the Physical and Functional Configuration Audits.

As part of System Level Testing, the system limits that ES&S has stated to be supported by the EVS 5.2.0.0 Voting System as well as the tested values and the test performed to verify each limit are compiled in Table 4-4.

**Table 4-4 EVS 5.2.0.0 System Limits**

| Limit (Maximum Number of) | Declared Value | Tested Value | Test Performed |
|---|---|---|---|
| Precincts in Election | 9,900 | 9,900 | Volume and Stress |
| Candidates/Counters in Election | 21,000 | 21,000 | Volume and Stress |
| Candidates/Counters in Precinct | 1,000 | 1,000 | Volume and Stress |
| Candidates/Counters in Tabulator | 65,535 | 65,535 | Volume and Stress |
| Maximum Precinct Element | 500,000 | 500,000 | Volume and Stress |
| Ballot Styles in Election | 9,900 | 9,900 | Volume and Stress |
| Contests in a Ballot Style | 200 | 200 | Volume and Stress |
| Candidates in a Contests | 175 | 175 | Volume and Stress |
| Ballot Styles in a Precinct | 40 | 40 | Volume and Stress |
| Number of Parties | Gen-=75, Prim=20 | Gen=75, Prim=20 | Volume and Stress |
| Vote For in Contest | 98 | 98 | Volume and Stress |
| Supported Languages per Election | 5* | Verified Possible | System Integration (3) |

*** "Verified Possible" means that the limit was tested during the FCA, but could not be verified in an election environment because of dependencies in the ballot layout configuration. The stated limits in the "Test Performed" column were tested in an election environment.**

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

#### 4.5.1 Volume and Stress Test

The EVS 5.2.0.0 Voting System 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 4-5 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 5.0.0.0 system. All ExpressVote cards were cast and tallied utilizing 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 4-5 EVS 5.2.0.0 Volume and Stress**

| | |
|---|---|
| Voting Pattern | "Test Decks" were created for each election definition:<br>**Election A**:<br><br>**LIMITS TESTED:**<br>▪ Maximum Precincts in an election (9900)<br>▪ Maximum Ballot Styles in an Election (9900)<br>❑ **ExpressVote Test Deck: Marked 99 cards**<br>▪ Voted each contest on card<br>❑ **ExpressVote: Marked first candidate in each contest on a card**<br><br>**Election C:**<br><br>**Limits Tested:**<br>▪ Maximum candidate counters/election (21,000)<br>▪ Maximum candidates/contest (175)<br>▪ Maximum "Vote for"/contest (98)<br>▪ Maximum number of parties in a General Election **(75)**<br>❑ **ExpressVote Test Deck: Marked 15 randomly selected cards** |

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

#### 4.5.1 Volume and Stress Test (Continued)

**Table 4-5 EVS 5.2.0.0 Volume and Stress (Continued)**

| | |
|---|---|
| Voting Pattern | **Election D:**<br><br>**Limits Tested:**<br>▪ Maximum number of parties in a Primary Election (20 including nonpartisan party)<br>❑ **ExpressVote Test Deck: 20 cards**<br>▪ Each candidate was marked<br>**Election E:**<br><br>**Limits Tested:**<br>▪ Maximum district types (20)<br>▪ Maximum district names (40)<br>❑ **ExpressVote Test Deck: 8 cards**<br>▪ Each candidate was marked |

**Table 4-6 EVS 5.2.0.0 Volume and Stress Cards Cast**

| EUT | Election A | Election B | Election C | Election D | Total Cards Cast |
|---|---|---|---|---|---|
| DS200 | 99 | 15 | 20 | 8 | 142 |
| ExpressVote | 99 | 15 | 20 | 8 | 142 |

**Summary Findings**

At the conclusion of the Volume and Stress Test, the DS200 and ExpressVote units successfully exercised the stated system limits. There was one (1) of each DS200 and ExpressVote component used for the duration of Volume and Stress performance. A total of 142 ballots were processed without issue upon the completion of the test.

#### 4.5.2 System Integration Test

System Integration Testing was performed to test all system hardware, software, and peripherals. System Integration Testing focused on the complete system including all proprietary software, proprietary hardware, proprietary peripherals, COTS software, COTS hardware, and COTS peripherals configured as described in the ES&S-submitted TDP for the EVS 5.2.0.0 Voting System. To perform the System Integration Testing, NTS Huntsville developed specific procedures and test cases designed to test the system as a whole. These procedures demonstrated compliance of the EVS 5.2.0.0 Voting System to Sections 2, 3, 4, 5, and 6 of Volume I of the VVSG.

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

#### 4.5.2 System Integration Test (Continued)

In order to further verify compatibility between 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, folded ballots, AutoMARK generated ballots, and ExpressVote generated ballots. The generated test deck was then utilized for system integration testing on the DS200 and DS850 with all expected results verified within ERM.

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

- GEN-01
- GEN-02
- GEN-03
- PRIM-01
- PRIM-02
- PRIM-03

**Summary Findings**

Through System Integration Testing, it was demonstrated that the system performed as documented with all components performing their intended functions. No anomalies were noted during testing.

#### 4.5.3 Security

EVS 5.2.0.0 was subjected to Security Testing in accordance with the requirements of Section 7.0 of Volume I and Section 6.4 of Volume II of the EAC 2005 VVSG. The purpose of the Security Test was to verify that the modifications included in the EVS 5.2.0.0 system including the introduction of the DS200 Hardware Version 1.3 and the ExpressVote did not compromise the security of the system. The focus of security testing was on the DS200 Hardware Version 1.3 and the ExpressVote with the remaining components being unmodified from the previously certified versions. Based on the modifications to the remainder of the system NTS determined all previous security testing for these components were reutilized and accepted for the current test campaign.

The ES&S TDP was utilized during this portion of testing to ensure the proper placement was identified within the documentation and the placement ensured the security of the component. The DS200 Hardware Version 1.3 underwent physical security testing in which all tie straps, seals, and locks were tested and verified. The ExpressVote underwent a full security test suite to provide verification of the access controls and the physical controls documented by ES&S.

**Summary Findings:**

NTS Huntsville reviewed the ES&S TDP security documentation and an analysis was performed on the ExpressVote configured as documented by ES&S. Attempts were made to access certain functions of the ExpressVote by users that did not have permissions to access those functions. Those attempts were unsuccessful. The ExpressVote and DS200 security tie straps, tamper evident seals, locks, and their documented installation were analyzed and found to be adequate. NTS Huntsville has determined the EVS 5.2.0.0 Voting System to be compliant with the security requirements of the EAC 2005 VVSG.

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

#### 4.5.4 Usability and Accessibility Test

The EVS 5.2.0.0 Voting System was subjected to Usability and Accessibility Tests in accordance with Volume I, Section 3 of the EAC 2005 VVSG. The purpose of this testing was to assess the DS200 Hardware Version 1.3 and the ExpressVote conformance to the usability and accessibility requirements in the EAC 2005 VVSG.

Conformance to these requirements should result in quality interaction between the voter and the voting system and the effectiveness with which the system provides a comfortable and efficient voting session that provides confidence to the voter that their votes are cast correctly. Additional requirements for task performance are independence and privacy: the voter should normally be able to complete the voting task without assistance from others and the voter selections should be private.

The Usability and Accessibility requirements set forth by the VVSG and the Help America Vote Act (HAVA) ensure that all eligible voters are provided the ability to vote without discrimination regardless of any disabilities. As stated in the VVSG, to meet the requirements of the Usability and Accessibility Test, the voting system shall: conform to the specified usability requirements of Volume I, Section 3.1; provide the capabilities required by Volume I, Section 3.2; and operate consistently with vendor specifications and documentation.

The requirements for physical, sensory, or cognitive disabilities shall be followed according to HAVA (a) (3) (B). Alternative languages shall be in accordance to HAVA (a) (4) and privacy mandated by HAVA (a) (1) (C). In addition, Common Industry Format (CIF) shall be used for testing purposes according to ANSI/INCITS 354-2001 and in accordance with the VVSG. To help meet this requirement, ES&S submitted a summative usability test report for the ExpressVote to NTS for review and is included in Appendix K of this report.

**Summary Findings**

During the Usability and Accessibility Test, there was one discrepancy recorded for the ExpressVote. Refer to Notice of Anomaly (NOA) No. 1 presented in Appendix F for further details. The test was repeated and the ExpressVote successfully met the requirements of the Usability and Accessibility Test. The DS200 Hardware Version 1.3 successfully met the requirements of the Usability and Accessibility Test.

#### 4.5.5 Data Accuracy Test

Per the VVSG Vol. II Section 4.7.1.1, “As indicated in Volume I, Section 4, 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. An accuracy test was performed on the ExpressVote based on the new component being introduced into the system and NTS Huntsville determined the DS200 (versions 1.2, 1.2.3, 1.3) also required an accuracy test based on the hardware and software changes made to each of the components. Based on the evaluation of the software changes to the AutoMARK and DS850 NTS Huntsville determined these components were excluded from the accuracy test, however the DS850 was utilized for tabulation of the ExpressVote cards that were printed during the ExpressVote accuracy test. The tables below summarize the accuracy test breakdown for the DS200 and the ExpressVote.

Tables 4-7 and 4-8 show the breakdown of the ballots processed during the Accuracy Test.

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

#### 4.5.5 Data Accuracy Test (Continued)

**Table 4-7 EVS 5.2.0.0 Accuracy DS200**

| Ballot Size | No. of Ballots | No. Vendor Marked | No. Hand Marked | No. Ballot Positions per Ballot | No. of Machines in Test | X Voted= | Total Ballot Positions | Total Ballots |
|---|---|---|---|---|---|---|---|---|
| 11 inch | 100 | 30 | 70 | 392 | 3 | 2 | 235,200 | 600 |
| 14 inch | 100 | 30 | 70 | 512 | 3 | 2 | 307,200 | 600 |
| 17 inch | 100 | 30 | 70 | 640 | 3 | 2 | 384,000 | 600 |
| 19 inch | 100 | 30 | 70 | 720 | 3 | 3 | 648,000 | 900 |
| **Total** | **400** | **120** | **280** | **N/A** | **N/A** | **9** | **1,574,400** | **2700** |

**Table 4-8 EVS 5.2.0.0 Accuracy ExpressVote**

| Ballot Size | No. of Cards | No. of ExpressPass cards with activation bar codes per unit | No. of blank ExpressVote cards per unit | No. Ballot Positions per Ballot | No. of Machines in Test | Total Ballot Positions | Total Cards |
|---|---|---|---|---|---|---|---|
| 11 inch | 100 | 10 | 90 | 800 | 5 | 400,000 | 500 |
| 14 inch | 100 | 10 | 90 | 800 | 5 | 400,000 | 500 |
| 17 inch | 95 | 10 | 85 | 800 | 5 | 380,000 | 475 |
| 19 inch | 95 | 10 | 85 | 800 | 5 | 380,000 | 475 |
| **Total** | **390** | **40** | 350 | **N/A** | **N/A** | **1,560,000** | **1950** |

**Summary Findings**

The EVS 5.2.0.0 Voting System successfully met the requirements of the Data Accuracy Test by scanning and processing at least 1,549,703 ballot positions.

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

#### 4.5.6 Physical Configuration Audit

A Physical Configuration Audit (PCA) of the EVS 5.2.0.0 Voting System was performed as part of the testing activities in accordance with Section 6.6 of Volume II of the 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.

The PCA performed on the EVS 5.2.0.0 Voting System consisted of inspecting the following:

- The EVS Election Management System (EMS) software platform
- ExpressVote Universal Vote Capture Device
- DS200 Precinct Digital Scanner
- AutoMARK ADA Ballot Marking Device
- DS850 Digital Scan Central Ballot Scanner
- All accessories, equipment, and documentation used with the EVS 5.2.0.0 Voting System

**Summary Findings**

A PCA was performed to baseline the system's hardware and software components that were used during the test campaign. No discrepancies were noted during the PCA.

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

#### 4.5.7 Functional Configuration Audit (FCA)

The functional configuration audit encompassed an examination of manufacturer's testing, and additional testing by the VSTL, to verify that the system hardware and software under scope for the test campaign performed all functions described in the manufacturer's documentation submitted as part of the TDP. In addition to functioning according to the manufacturer's documentation, tests were conducted to ensure the system hardware and software met all applicable EAC 2005 VVSG requirements. The FCA for the EVS 5.2.0.0 campaign included the EMS, ExpressVote, DS200, AutoMARK, and DS850.

A Functional Configuration Audit (FCA) of the ES&S EVS 5.2.0.0 was performed in accordance with Section 6.7 of Volume II of the VVSG. The purpose of the FCA was to verify that the EVS 5.2.0.0 system under scope performed as documented in the ES&S-supplied technical documentation during pre-voting, voting, and post-voting activities and validated that the EVS 5.2.0.0 meets the requirements of the EAC 2005 VVSG. To perform the FCA, the EVS 5.2.0.0 was subjected to a series of tests to simulate pre-voting, voting, and post-voting activities. These tests were performed to ensure compatibility of voting machine functions at the precinct level using the referenced firmware. During the FCA, both normal and abnormal data was input into the system to attempt to introduce errors and test for error recovery. The activities simulated were:

- Verification of hardware status via diagnostic reports prior to election;
- Performing procedures required to prepare hardware for election operations;
- Obtaining 'zero' machine report printouts on all contest fields;
- Performing procedures to open the polling place and enable ballot counting;
- Casting of ballots to demonstrate proper processing, error handling, and generation of audit data;
- Performing hardware operations required to disable ballot counting and closing the polls;
- Obtaining machine reports and verifying correctness
- Obtaining machine-generated audit logs and verifying correctness

The FCA was divided into three phases: pre-voting, voting, and post-voting. The three phases are described in greater detail in the following paragraphs:

1. Pre-Voting

   Pre-Voting encompasses all activities performed to the point of loading the election data on a transport media. These activities include verifying roles, user administration, database administration, defining the political subdivisions, defining election types, defining voting variations, defining the ballot contents, audio ballot definition, election definition loading, auditing election creation process, producing pre-election reports, adding to existing elections, updating existing elections, modifying ballot styles, verifying alternative language translations, and loading an election on precinct count devices.

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

### 4.5.7 Functional Configuration Audit (FCA) (Continued)

2. Voting

Voting encompasses all activities performed by poll workers, voters, and warehouse maintenance technicians after an election has been loaded, through the processing of special votes such as absentee and provisional ballots. These activities include pre-election logic testing, diagnostic tests, opening the polls, activating ballots, voting and casting both normal and audio ballots, utilizing the usability and accessibility aspects of the accessible voting station, closing the polls, printing machine reports, performing post-election maintenance tasks, and executing special voting sessions such as the processing of absentee and provisional ballots.

3. Post-Voting

Post-Voting encompasses all activities performed from verification of machine reports to the EMS post-election activities. These activities include verifying election results, tabulation of results, consolidating voted data, Election Media maintenance & cleaning, Election Media logs, concluding an election, backing up results, retaining election data for 22 months, deleting elections, and auditing voting machine log.

**Summary Findings**

A Functional Configuration Audit was performed on the EMS, DS200, ExpressVote, AutoMARK, and DS850 to ensure it functions and operates as described with the system's technical documentation. A total of seven discrepancies were documented during the FCA. All discrepancies notated during the FCA are included within Notice of Anomaly No.5, Rev A and further detail is located within Appendix F of this report. All discrepancies noted were corrected and retested to validate the fix prior to the conclusion of the test campaign.

(The remainder of this page intentionally left blank)

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.5 System Level Testing (Continued)

#### 4.5.8 Availability

The voting system achieved at least 99 percent availability during normal operation for the applicable functions of the system.

### 4.6 Anomalies and Resolutions

A total of five (includes Source Code and TDP) Notices of Anomaly were issued throughout the test campaign upon occurrence of a verified failure, an unexpected test result, or any unsatisfactory condition. All anomalies encountered during testing were successfully resolved prior to test completion. The Notices of Anomaly generated are presented in their entirety in Appendix F of this report and are summarized below, along with their resolution.

Notice of Anomaly (NOA) No. 1: Usability and Accessibility Test:

The horizontal distance between the centers of the keys on the touchscreen keyboard on the ExpressVote was less than 0.8 inches.

Resolution to Anomaly No. 1:

ES&S acknowledged the anomaly and resolved the issue in a subsequent version of the firmware. The distance between the keys was re-tested and found to be compliant.

Notice of Anomaly No. 2: Acoustic Noise Level Test: The ExpressVote would not allow the voter to decrease the volume at the beginning of each voting session.

Resolution to Anomaly No. 2:

ES&S acknowledged the anomaly and resolved the issue in a subsequent version of the firmware. The Acoustic Test was repeated and the volume levels were complaint.

Notice of Anomaly No. 3: Technical Data Package (TDP) Review

Review of the submitted documentation revealed discrepancies between the TDP and the EAC 2005 VVSG requirements. Functional testing also identified text in the TDP that conflicted with the actual operation of the system. Each noted discrepancy was documented in detail in the NTS Huntsville-generated TDP review reports on file as raw data. The review results were recorded in a worksheet that provided the pass/fail compliance to each applicable EAC 2005 VVSG requirement. ES&S corrected each nonconformance observation and resubmitted the associated documents for review. This process continued until the TDP complied with all applicable requirements.

Resolution to Anomaly No. 3:

The EVS 5.2.0.0 Voting System is a Modification of a previously certified system. As such the TDP was only reviewed where modified or where impacted by system modification. ES&S corrected each nonconformance observation and resubmitted the associated documents for review. This process continued until the TDP complied with all applicable requirements.

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.6 Anomalies and Resolutions (Continued)

Notice of Anomaly No. 4: Source Code Review

Review of the submitted source code modules comprising the EVS 5.2.0.0 Voting System revealed deviations from the standard as well as issues with the commenting. These anomalies are documented in detail in the NTS-Huntsville generated review reports on file as raw data. Upon completion of the review for each source code submission, a technical summary report of all identified standards violations was sent to ES&S for resolution. ES&S then corrected the reported violations and re-submitted the source code for re-review. This process was repeated as many times as necessary until all identified standards violations were corrected.

Resolution to Anomaly No. 4:

Upon completion of the review for each source code submission, a technical summary report of all identified standards violations was sent to ES&S for resolution. ES&S then corrected the reported discrepancies and re-submitted the source code for re-review. All discrepancies were resolved by ES&S before the conclusion of the test campaign. Additional information can be located in tables 4-1 and 4-2 of this document.

Notice of Anomaly No. 5 Rev A: Functional Configuration Audit (FCA)

During the FCA, seven discrepancies were identified and included within this NOA. The following discrepancies were documented:

1. "ExpressVote General Error. Unknown Error occurred. Please Contact an Election Official. An Error has occurred." Message displayed when attempting to generate hash of Firmware/OS/Bootloader with Include Graphics Option checked.
2. Open Primary contests without party preference on the ExpressVote: Voting in more than one party's contests caused candidates to display as selected, but not print.
3. When attempting to print a ballot image in ElectionWare, if a new printer is selected when attempting to print ballot images, the image will print to the previously selected printer.
4. When attempting to print a ballot image in ElectionWare, pressing the "X" button to close the printer window causes the image to be printed anyways.
5. Enable/Disable BOL Scanning option is stated incorrectly in the system log as "Bypass Graphics/Audio Check Option Enabled/Disabled" on the ExpressVote.
6. For DS200 tabulation in ERM, the option "Update DS200 Results from SFTP" is not greyed out.
7. The DS200 was incorrectly displaying the ballot counts for the ExpressVote cards on the QR Status Code screen. The ExpressVote cards were being counted as DS200 ballots after the polls were closed.

Resolution to Anomaly No. 5 Rev A Items 1, 5, and 7:

ES&S acknowledged the discrepancies and resolved them in subsequent versions of the ExpressVote and DS200 firmware. The items were retested and found to be compliant.

Resolution to Anomaly No. 5 Rev A Items 2, 3, 4, and 6:

ES&S acknowledged the discrepancies and resolved them in subsequent versions of the ElectionWare and ERM software. The items were retested and found to be compliant.

## 4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

### 4.7 Recommendation for Certification

NTS Huntsville performed conformance/specification testing on the modifications to EVS 5.2.0.0 Voting System to the EAC 2005 VVSG (Version 1.0). During the test campaign, all data from pre-testing, hardware testing, software testing, functional testing, security testing, volume testing, stress testing, usability testing, accessibility testing, and reliability testing activities was combined to ensure all VVSG requirements that are supported by the EVS 5.2.0.0 Voting System had been tested. NTS Huntsville also used discretion as granted by the VVSG to design and exercise FCA Test Cases, perform source code reviews, and perform Security Tests.

NTS Huntsville performed conformance testing on all modifications submitted for the ES&S EVS 5.2.0.0 Voting System. The modifications and additions met the requirements of the EAC 2005 VVSG and the manufacturer's technical documentation. As such, NTS Huntsville recommends the EAC grant the ES&S EVS 5.2.0.0 Voting System certification to the EAC 2005 VVSG.

This report is valid only for the equipment identified in Section 2 of this report. Any changes, revisions, or corrections made to the system after this evaluation shall be submitted to the EAC to determine if the modified system requires a new application, or can be submitted as a modified system. The scope of testing required was determined based upon the degree of modification.

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

# APPENDIX A

# SYSTEM MODIFICATIONS

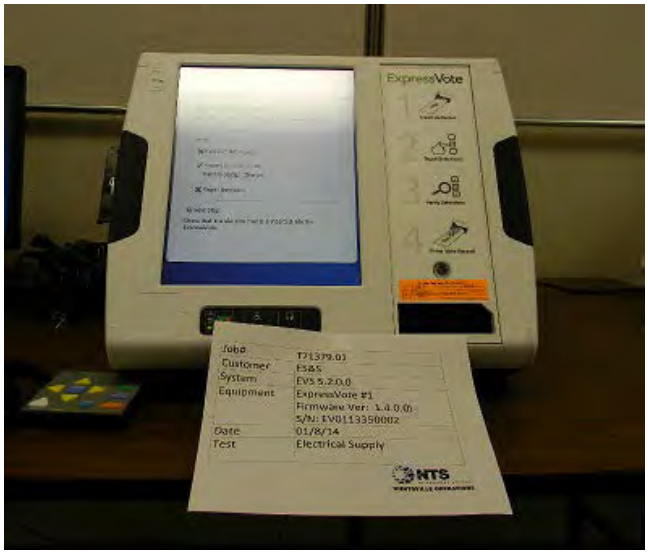
| Item Number | Module Affected | Version Number | Modification |
|---|---|---|---|
| 1 | ExpressVote | Hardware v1.0 | Addition of a new universal vote capture device |
| 2 | DS200 | Hardware 1.2.3 | Incorporates all changes in ECO 1281 |
| 3 | DS200 | Hardware v1.3 | Implement new motherboard and new scanner board as previous boards are going end-of-life (EOL). |
| 4 | DS200 | Hardware v1.3 | Transport component update to enhance ballot handling and manufacturing tolerances. |
| 5 | DS200 | Hardware v1.3 | Replace CFL backlight with LED backlight due to EOL (end of life). |
| 6 | DS200 | Hardware v1.3 | Usability and compatibility enhancements to battery compartment access, ballot box replacement rails, power/close compartment switch, and equipment labeling. |
| 7 | ExpressVote & ElectionWare | ExpressVote FW 1.4.0.0; ElectionWare 4.6.0.0 | Enhancement to support the Open Primary election type. |
| 8 | ExpressVote | ExpressVote FW 1.4.0.0 | Enhancement to update the field length displayed on the ExpressVote |
| 9 | ExpressVote & ElectionWare | ExpressVote FW 1.4.0.0; ElectionWare 4.6.0.0 | This enhancement will allow the ExpressVote to display the customized precinct name that is configured in ElectionWare. |
| 10 | DS200 & ElectionWare | DS200 FW 2.12.0.0 ElectionWare 4.6.0.0 | The ability for the DS200 to query blank ExpressVote activation cards. |
| 11 | ElectionWare | ElectionWare 4.6.0.0 | Enhances the cast vote record (CVR) export so that contest totals by district can be derived from the CVR spreadsheet. |
| 12 | DS200 | Firmware 2.12.0.0 | The enhancement allows an override to bypass “diverter not installed” stop and keep scanning. |
| 13 | DS850 | Firmware 2.10.0.0 | Added the ability to password protect the generation of results reports. |
| 14 | DS200 | Firmware 2.12.0.0 | Enhancement so the candidate order on the zero and results reports on the DS200 matches the ballot for that precinct. |
| 15 | DS200, DS850, ExpressVote, AutoMARK, & ElectionWare | DS200 FW 2.12.0.0; DS850 FW 2.10.0.0; ExpressVote FW 1.4.0.0; AutoMARK FW 1.8.6.0; ElectionWare 4.6.0.0 | Implement method to validate hash values with Trusted Build to conform to RFI 2012-04. |
| 16 | System Wide | EVS 5.2.0.0 | TDP update for Configuration Management to conform to RFI 2012-03. |
| 17 | ERM | ERM 8.11.0.0 | Audit Log timestamp updates to conform with RFI 2013-03. |
| 18 | System Wide | EVS 5.2.0.0 | Quality Improvements: enhancements to any GUI related issues and toolbox improvements |
| 19 | ExpressVote & AutoMARK | ExpressVote FW 1.4.0.0 AutoMARK FW 1.8.6.0 | Pennsylvania rule for contest re-voting conditions associated with Straight Party ticket voting. |
| 20 | ExpressVote & AutoMARK | ExpressVote FW 1.4.0.0 AutoMARK FW 1.8.6.0 | Enhancements of the ExpressVote and AutoMARK screens for plain language and conformance to usability guidelines. |
| 21 | ERM | ERM 8.11.0.0 | The ERM csv export excludes some vote totals when PRC contest types are used. |
| 22 | DS200, DS850, AutoMARK, ERM, & ElectionWare | DS200 FW 2.12.0.0; DS850 FW 2.10.0.0; AutoMARK FW 1.8.6.0; ERM 8.11.0.0 ElectionWare 4.6.0.0 | Illinois tabulation rule: An overvoted contest must count as 1 in the overvote tally, rather than being counted as the same number as the Vote-for in the contest. |
| 23 | System Wide | EVS 5.2.0.0 | Upgrade to Adobe Standard version XI. |
| 24 | System Wide | EVS 5.2.0.0 | Routine task updates for every release. For example: TDP updates, hardening scripts, source code file listings, and change notes. |
| 25 | DS850 | DS850 FW 2.10.00 | DataWin updates to DS850 firmware |

# APPENDIX B

# PHOTOGRAPHS

**Photograph No. 1**
**ExpressVote Acoustic Noise Level Test Setup**

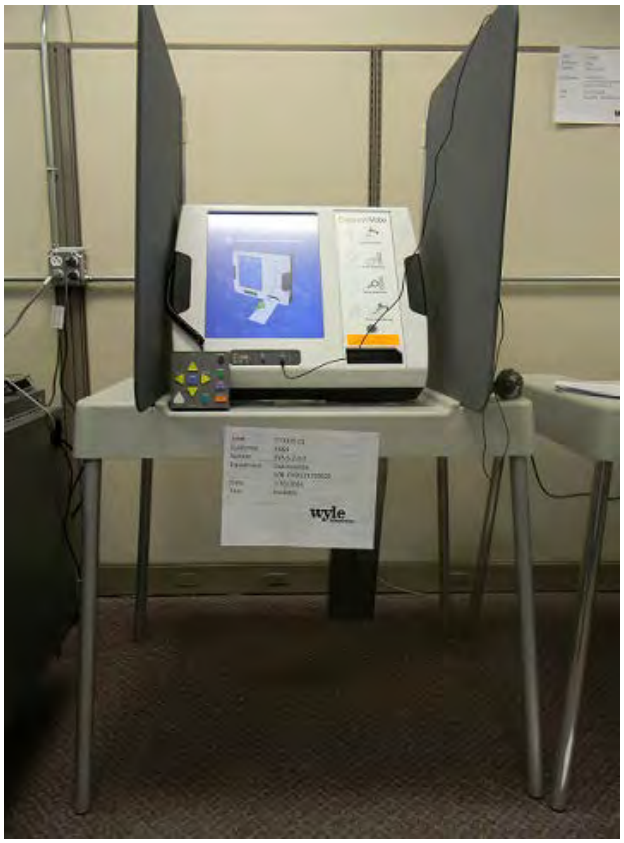

**Photograph No. 2**
**DS200 Electrical Supply Test Setup**




**Photograph No. 3**
**ExpressVote Electrical Supply Test Setup**


**Photograph No. 4**
**DS200 Maintainability Test Setup**

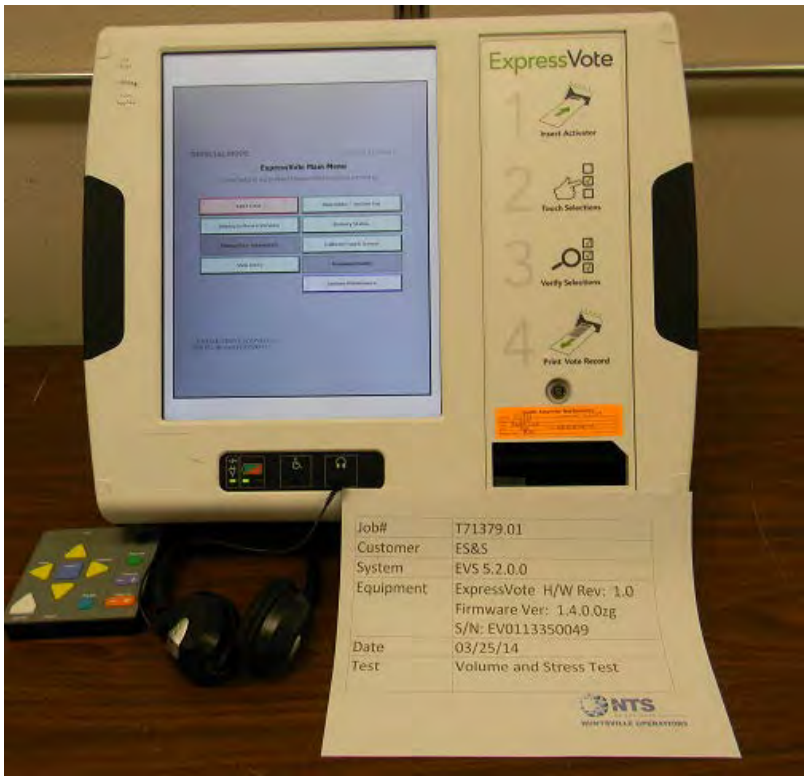

**Photograph No. 5**
**ExpressVote Maintainability Test Setup**




**Photograph No. 6**
**Usability and Accessablity Test Setup**

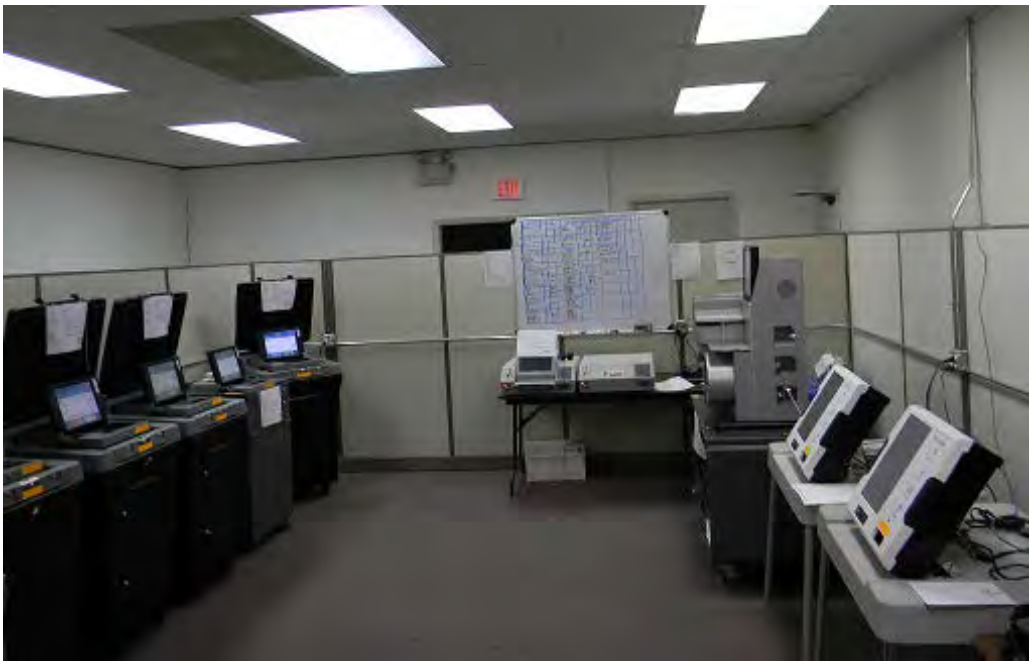
**Photograph No. 7**
**DS200 Accuracy Test Setup**

**Photograph No. 8**
**ExpressVote Accuracy Test Setup**



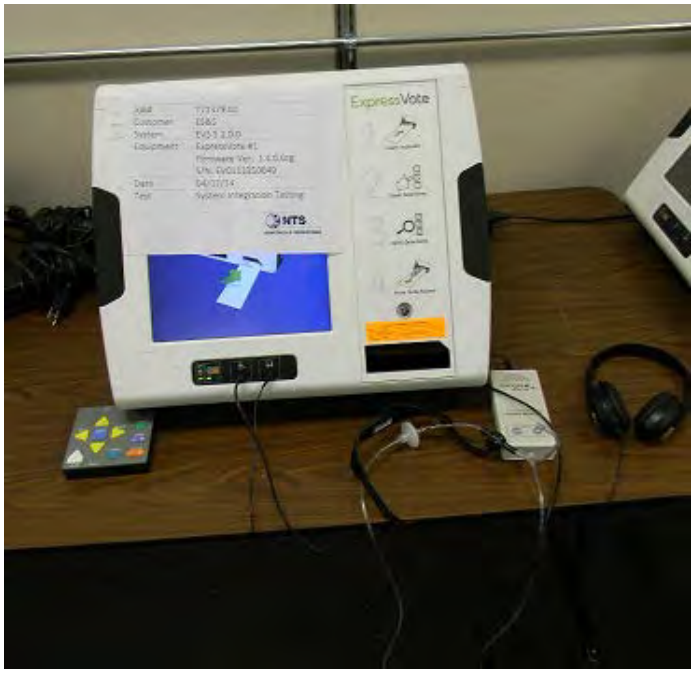

**Photograph No. 9**
**Volume and Stress Test Setup**


**Photograph No. 10**
**Volume and Stress Test Setup**



**Photograph No. 11**
**System Integration Test Setup**

**Photograph No. 12**
**DS200 System Integration Test Setup**




**Photograph No. 13**
**ExpressVote System Integration Test Setup**


**Photograph No. 14**
**AutoMARK System Integration Test Setup**


**Photograph No. 15**
**DS850 System Integration Test Setup**

# APPENDIX C

# NTS'S CERTIFICATION TEST PLAN NO. T71379.01-01

# CERTIFICATION TEST PLAN

Prepared for:

| | |
|---|---|
| **Manufacturer Name** | ES&S |
| **Manufacturer System** | EVS 5.2.0.0 |
| **EAC Application No.** | **ESSEVS5200** |
| **Manufacturer Address** | 11208 John Galt Boulevard<br>Omaha, NE 68137 |

| NTS WE ENGINEER SUCCESS HUNTSVILLE OPERATIONS | | | REPORT NO. Test Plan No. T71379.01 Rev A |
|---|---|---|---|
| | | | DATE April 25, 2014 |
| REV | DATE | PAGE OR PARAGRAPH AFFECTED | DESCRIPTION OF CHANGES |
| --- | 02-13-14 | Entire Document | Original Release |
| A | 3-13-14 | 1.2 | Removed "but not limited to" and corrected Appendix C |
| A | 3-13-14 | 1.3 | Corrected section, added more information |
| A | 3-13-14 | 1.4 | Updated section 1.4 |
| A | 3-13-14 | 1.7.2 | Added Vote Capture Device |
| A | 3-13-14 | 1.7.3 | Reworded ElectionWare description |
| A | 3-13-14 | 2.2 | Removed the word significant |
| A | 3-13-14 | 3.3 | Updated table 3-3 |
| A | 3-13-14 | 4.1 | Reworded Usability section |
| A | 3-13-14 | 4.2 | Removed the word "are" |
| A | 3-13-14 | 4.4.1 | Updated paragraph |
| A | 3-13-14 | 4.4.3 | Reworded 4th paragraph |
| A | 3-13-14 | 4.4.5 | Removed the word "are" |
| A | 3-13-14 | 4.6 | Updated table 4-2 |
| A | 3-13-14 | 4.7 | Reworded 2nd paragraph |
| A | 3-13-14 | 5.2 | Reworded paragraph |
| A | 3-13-14 | 6.3.2 | Reworded Security Source Code Review |
| A | 3-13-14 | 6.3.2 | Reworded COTS generated source code paragraph |
| A | 3-13-14 | 6.3.2 | Reworded Error Recovery Test section |
| A | 3-13-14 | 6.3.3 | Added comma after the word documentation |
| A | 3-13-14 | 6.3.3 | Reworded the Regression Testing section |

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)



APPENDICES

## 1.0 INTRODUCTION

The purpose of this National Certification Test Plan (Test Plan) is to document the procedures that National Technical Systems, Incorporated (NTS) will follow to perform certification testing of the Election Systems and Software (ES&S) EVS 5.2.0.0 voting system to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (EAC 2005 VVSG). Prior to submitting the system for certification testing, ES&S submitted an application to the EAC for certification of the EVS 5.2.0.0 voting system modification to the previously certified EVS 5.0.0.0 (Certification number: ESSEVS5000) voting system. This test plan follows Notice of Clarification 09-005: Development and Submission of Test Plans for Modifications to EAC Certified Systems and Notice of Clarification 13-02: Detailed Description of Changes for Modifications.

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

### 1.1 Established Baseline System

The baseline system for this modification is the EVS 5.0.0.0 voting system. Tables 1-1, 1-2, and 1-3 describe the certified equipment and firmware versions. For full details about the EVS 5.0.0.0 test campaign refer to Wyle Laboratories' Test Report No. T59087.01-01 Rev. A posted on the EAC website.

**Table 1-1 EVS 5.0.0.0 Voting System Hardware Components**

| Component | Hardware Version | Firmware Version |
|---|---|---|
| DS200 | 1.2.1 | 2.7.0.0 |
| AutoMARK A100 | 1.0 | 1.8.1.0 |
| AutoMARK A200 (SBC 2.0) | 1.1 | 1.8.1.0 |
| AutoMARK A200 (SBC 2.5) | 1.1 | 1.8.1.0 |
| AutoMARK A300 (SBC 2.0) | 1.3 | 1.8.1.0 |
| AutoMARK A300 (SBC 2.5) | 1.3 | 1.8.1.0 |
| DS850 | 1.0 | 2.4.0.0 |

**Table 1-2 EVS 5.0.0.0 Voting System Software Components**

| Component | Version |
|---|---|
| ElectionWare | 4.1.0.0 |
| Election Reporting Manager (ERM) | 8.6.0.0 |
| ES&S Event Log Service | 1.5.0.0 |
| VAT Previewer | 1.8.1.0 |
| Removable Media Service | 1.4.0.0 |

**Table 1-3 EVS 5.0.0.0 Voting System EMS Components**

| Equipment | Description | Serial Number |
|---|---|---|
| Server PC | Dell PowerEdge T410 | 4D6BQM1 |
| Server PC | Dell PowerEdge T710 | JPZ6VR1 |
| Client PC | Dell OptiPlex 980 | 3TZJFQ1 |
| Client PC | Dell Latitude E6410 | 232F0M1 |

## 1.0 INTRODUCTION (Continued)

### 1.2 Scope of Modification

The purpose of this modification is to introduce the ExpressVote, DS200 1.3 & 1.2.3 hardware into the previously certified EVS 5.0.0.0 voting system. In addition, ES&S submitted software changes to the DS200, DS850, AutoMARK, ElectionWare, and Election Reporting Manager (ERM).

The system changes submitted to the EAC in the Application for Certification (ESS1303) include functional and hardware modifications to the EMS, DS850, and DS200. Functional upgrades were made throughout this modification including software fixes, conformance with new RFIs released before application submission, software to enhance usability, replacement of hardware parts nearing end of life, and integration with the EVS suite to enhance usability and performance. These modifications are presented in their entirety in Appendix C.

### 1.3 Initial assessment

The ExpressVote hardware version 1.0 was submitted for testing in a previous state campaign for the State of Florida (FL EVS 4.5.0.0) that concluded on November 18, 2013. NTS personnel have analyzed the results of the FL EVS 4.5.0.0 testing to determine prior testing acceptance (Wyle Test Repot No. T71013.02-01). Details of this analysis are in section 4.4.1 Hardware Qualitative Examination Design. Based on this analysis, all hardware testing from the FL EVS 4.5.0.0 test campaign was determined to be meet the requirements for reuse. As part of the EVS 5.2.0.0 test campaign, the ExpressVote hardware version 1.0 shall be subjected to Physical Configuration Audit (PCA), Electrical Supply Testing, Maintainability Testing, Acoustical Testing, Usability and Accessibility Testing, Functional Configuration Audit (FCA), Security Testing, Accuracy Testing, and Volume and Stress Testing. In addition, to verify that the modifications to the voting system do not introduce any nonconformities or instabilities, the EVS 5.2.0.0 voting system shall be subjected to a system integration test to ensure all components interact properly.

The DS200 Version 1.3 hardware was submitted for testing in a previous state campaign for the State of Florida (FL EVS 4.5.0.0) that concluded on September 18, 2013. NTS personnel have analyzed the results of the FL EVS 4.5.0.0 testing to determine prior testing acceptance (Wyle Test Report No. T71013.01-01). Details of this analysis are in Section 4.4.1 Hardware Qualitative Examination Design. Based on this analysis, all hardware testing from the FL EVS 4.5.0.0 test campaign was determined to be meet the requirements for reuse. As part of the EVS 5.2.0.0 test campaign, the DS200 hardware Version 1.3 shall be subjected to functional configuration audit (FCA), accuracy, maintainability, accessibility, usability, security, physical configuration audit (PCA), system integration, reliability, and electrical supply testing.

The software utilized for the EVS 5.2.0.0 campaign will comprise of the new ExpressVote software and changes to the DS200, DS850, AutoMARK, ElectionWare, and Election Reporting Manager (ERM) software. All source code will be compared to the EAC certified EVS 5.0.0.0 version to determine the extent of the source code review required. Based on this examination, NTS personnel will perform software code review to ensure that all applicable VVSG requirements are met and changes to the software do not introduce any new functions or features outside of the modifications in Appendix C.

The DS200 Version 1.2.3 hardware incorporates ECO1281 (modifications to the transport assembly and sheet metal) into the previously-certified (EVS 5.0.0.0)1.2.1 hardware. ECO1281 was conditionally approved by the EAC contingent that the change will be tested in the next EAC certification effort. Based on the EAC response to ECO1281, NTS personnel will incorporate a DS200 with this modification throughout testing.

An initial assessment has been performed on the TDP submitted by ES&S for EVS 5.2.0.0. The initial assessment determined that all required documents were delivered to implement the TDP review. The TDP is constructed with the EVS 5.0.0.0 certified TDP and the EVS 5.2.0.0 changes as an addendum.

## 1.0 INTRODUCTION (Continued)

### 1.4 References

The documents listed below were used in the development of the test plan and will be utilized to perform certification testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines," and Volume II, Version 1.0, "National Certification Testing Guidelines," dated December 2005
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date June 1, 2011
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 1.0, expires November 2014
- 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 5
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- EAC Requests for Interpretation (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
- Wyle Test Report No. T71013.02-01 – Hardware Compliance Testing of Election Systems and Software FL EVS 4.5.0.0 ExpressVote Hardware Version 1.0
- Wyle Test Report No. T71013.01-01 Hardware Compliance Testing of Election Systems and Software FL EVS 4.5.0.0 DS200 Hardware Version 1.3
- Wyle Test Report No. T59087.01-01 Rev A – National Certification Test Report of Election Systems and Software EVS 5.0.0.0

(The remainder of this page intentionally left blank)

## 1.0 INTRODUCTION (Continued)

### 1.5 Terms and Abbreviations

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

**Table 1-4 Terms and Abbreviations**

| Term | Abbreviation | Definition |
|---|---|---|
| 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 | --- |
| Commercial Off the Shelf | COTS | Commercial, readily available hardware or software. |
| 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 | --- |
| Election Management System | EMS | Within the EVS 5.2.0.0 voting system, the EMS is comprised of five components: ElectionWare, ERM, ES&S Event Log Service, and VAT Previewer. |
| Election Reporting Manager | ERM | EVS EMS reporting component. |
| Election Systems and Software | ES&S | --- |
| Equipment Under Test | EUT | Refers to the individual system component or multiple piece of the same component |
| ES&S Voting System | EVS | --- |
| 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. |

(The remainder of this page intentionally left blank)

1.0 INTRODUCTION (Continued)

1.5 Terms and Abbreviations (Continued)

Table 1-4 Terms and Abbreviations (Continued)

| Term | Abbreviation | Definition |
|---|---|---|
| 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 5.2.0.0 voting system. |
| Quality Assurance | QA | -- |
| System Under Test | SUT | Refers to the system as a whole (all components) |
| Secure File Transfer Protocol | SFTP | A network protocol that provides file access, file transfer, and file management functionality over any reliable data stream. |
| 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 | --- |
| Uninterruptible Power Supply | UPS | --- |
| Voter Assist Terminal | VAT | The electronic ballot marking device component is the ES&S AutoMARK. |
| Voluntary Voting System Guidelines | EAC 2005 VVSG | Published by the EAC, the third iteration of national level voting system standards. |
| National Technical Systems, Inc. | NTS | --- |
| NTS Operating Procedure | OP | NTS Test Method or Test Procedure. |
| Voting System Test Laboratory | VSTL | NTS |
| Voluntary Voting System Guidelines | VVSG | EAC Voluntary Voting System Guidelines Version 1.0. |
| Quick Response Code | QR Code | Two-dimensional barcode |

(The remainder of this page intentionally left blank)

1.0 INTRODUCTION (Continued)

1.6 Testing Responsibilities

Prior to the development of this test plan, NTS evaluated test results from two previous test campaigns performed by Wyle: EVS 5.0.0.0 and FL EVS 4.5.0.0. The purpose of this evaluation was to determine the scope of testing required for system certification. Based on this evaluation, NTS determined that testing from previous test campaigns could be utilized to satisfy some requirements of this test campaign. Sections 2.1 and 4.4.1 contain additional details of this evaluation. All other core and non-core software and hardware certification testing shall be conducted under the guidance of qualified NTS personnel.

1.6.1 Project Schedule

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

1.6.2 Test Case Development

NTS will utilize the "NTS Baseline Test Cases" augmented with specially designed test cases tailored to the EVS 5.2.0.0 voting system for the Functional Configuration Audit (FCA), Usability, and System Integration Tests. NTS has designed specific election definitions and test cases for the Operational Status Check and the Accuracy Tests.

1.6.3 Test Procedure Development and Validation

NTS will utilize the NTS Operating Procedures (OPs) during the duration of this test program.

1.6.4 Third-Party Tests

NTS will not utilize any 3rd party testing during performance of the EVS 5.2.0.0 test campaign.

(The remainder of this page intentionally left blank)

## 1.0 INTRODUCTION (Continued)

### 1.7 Target of Evaluation Description

The following sections address the design methodology and product description of the EVS 5.2.0.0 Voting System as taken from the ES&S technical documentation.

#### 1.7.1 System Overview

The ES&S EVS 5.2.0.0 voting system is a comprehensive suite of vote tabulation equipment and software solutions providing end-to-end election management. Tables 1-5 and 1-6 detail the EVS 5.2.0.0 voting system with the following core system components.

**Table 1-5 EVS 5.2.0.0 Voting System Hardware Components**

| Component | Hardware Version | Firmware Version |
|---|---|---|
| ExpressVote | 1.0 | 1.4.0.0 |
| DS200 | 1.2.1 | 2.12.0.0 |
| DS200 | 1.2.3 | 2.12.0.0 |
| DS200 | 1.3 | 2.12.0.0 |
| AutoMARK A100 | 1.0 | 1.8.6.0 |
| AutoMARK A200 (SBC 2.0) | 1.1 | 1.8.6.0 |
| AutoMARK A200 (SBC 2.5) | 1.1 | 1.8.6.0 |
| AutoMARK A300 (SBC 2.0) | 1.3 | 1.8.6.0 |
| AutoMARK A300 (SBC 2.5) | 1.3 | 1.8.6.0 |
| DS850 | 1.0 | 2.10.0.0 |

**Table 1-6 EVS 5.2.0.0 Voting System Software Components**

| Component | Version |
|---|---|
| ElectionWare | 4.6.0.0 |
| Election Reporting Manager (ERM) | 8.11.0.0 |
| Removable Media Service (RMS) | 1.4.5.0 |
| ES&S Event Log Service (ELS) | 1.5.5.0 |
| VAT Previewer | 1.8.6.0 |
| ExpressVote Previewer | 1.4.0.0 |
| ExpressPass Application* | 1.1.0.0 |

*ExpressPass Application software is not in the scope of certification, but NTS will review the source code for 2005 VVSG compliance.

#### 1.7.2 System Hardware

The EVS 5.2.0.0 voting system can be set up to support one or more of the following hardware components:

- ExpressVote Vote Capture Device
- DS200 Precinct Tabulator
- AutoMARK Voting Assist Terminal
- DS850 Central Tabulator

Each of these components is described below.

1.0 INTRODUCTION (Continued)

1.7 Target of Evaluation Description (Continued)

1.7.2 System Hardware (Continued)

**Vote Capture Device: ExpressVote**

The ExpressVote is a universal vote capture device with an independent voter-verifiable paper record that is digitally scanned for tabulation by the DS200 or the DS850. This system combines paper-based voting with touch screen technology. The ExpressVote includes a mandatory vote summary screen that requires voters to confirm or revise selections prior to printing the summary of ballot selections using the internal thermal printer. Once printed, ES&S ballot scanners process the vote summary card.

**Photograph 1: ExpressVote**

**Precinct Ballot Tabulator: DS200**

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

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

1.0 INTRODUCTION (Continued)

1.7 Target of Evaluation Description (Continued)

1.7.2 System Hardware (Continued)

**Electronic Ballot Marking Device: AutoMARK Voter Assist Terminal (VAT)**

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

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

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

**Central Tabulator: DS850**

The DS850 is a high-speed, digital scan central ballot counter. During scanning, the DS850 prints a continuous audit log to a dedicated audit log printer and can print results directly from the scanner to a second connected printer. The scanner saves results internally and to results collection media (USB flash media) that officials can use to format and print results from a PC running Election Reporting Manager. The DS850 has an optimum throughput rate of 300 ballots per minute and uses cameras and imaging algorithms to image the front and back of a ballot, evaluate the results, and sort ballots into discrete bins to maintain continuous scanning.

**EMS Client/Server Configuration**

EVS 5.2.0.0 voting system Election Management System (EMS) utilizing a COTS PC configured with a Server running Windows Server 2008 R2 and a combination of a client laptop and a client desktop running Windows 7 Professional.

1.7.3 System Software

The EVS 5.2.0.0 voting system EMS is an application suite comprised of six components: ElectionWare, Election Reporting Manager (ERM), Removable Media Service (RMS), ES&S Event Log Service (ELS), VAT Previewer, and ExpressVote Previewer.

**ElectionWare**

ElectionWare integrates the election administration functionality into a unified application. Its intended use is to define an election and create the resultant media files used by the DS200 tabulator, AutoMARK Voter Assist Terminal (VAT), the DS850 Central Ballot Scanner, ExpressVote, and Election Reporting Manager (ERM). It also has an integrated ballot viewer that allows election officials to view the scanned ballot and captured ballot data side-by-side and produce ballot reports.

1.0 INTRODUCTION (Continued)

1.7 Target of Evaluation Description (Continued)

1.7.3 System Software (Continued)

**Election Reporting Manager (ERM)**

Election Reporting Manager (ERM) generates paper and electronic reports for election workers, candidates, and the media. Jurisdictions can use a separate ERM installation to display updated election totals on a monitor as ballot data is tabulated, and send the results' reports directly to the media outlets.

ERM supports accumulation and combination of ballot results data from all ES&S tabulators. Precinct and accumulated total reports provide a means to accommodate candidate and media requests for totals and are available upon demand. High-speed printers are configured as part of the system accumulation/reporting stations PC and related software.

**Removable Media Service (RMS)**

Removable Media Service (RMS) is an application that runs in the background of the EMS client workstation and supports the installation and removal of election and results media.

**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. The ES&S Event Log Service closes any active ES&S software application if the system detects the improper deactivation of the Windows Event Viewer.

**VAT Previewer**

The VAT Preview is an application within the EMS program that allows the user to preview audio text and screen layout prior to burning Election Day media for the AutoMARK.

**ExpressVote Previewer**

The ExpressVote Previewer is an application within the EMS program that allows the user to preview audio text and screen layout prior to burning Election Day media for the ExpressVote.

(The remainder of this page intentionally left blank)

## 1.0 INTRODUCTION (Continued)

### 1.7 Target of Evaluation Description (Continued)

#### 1.7.4 System Operational Concept

The operational flow and low-level system interfaces for the EVS 5.2.0.0 voting system is illustrated in Figure 1-1.

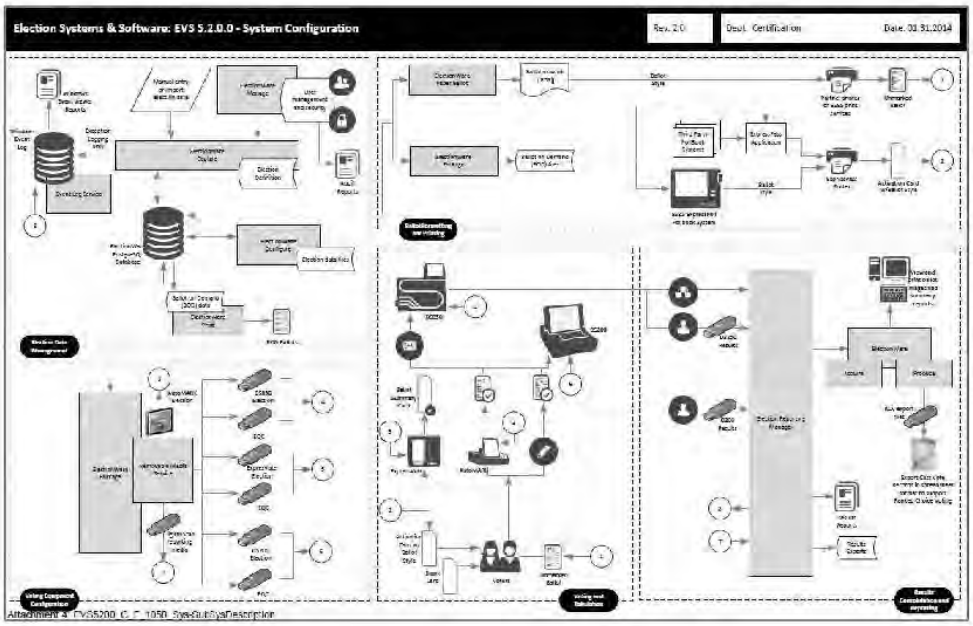



FIGURE 1-1 SYSTEM OVERVIEW DIAGRAM

(The remainder of this page intentionally left blank)

## 2.0 PRE-CERTIFICATION TESTING AND ISSUES

NTS has conducted a pre-certification review, and findings indicate that all system changes are consistent with the change items documented in the EAC Application ESS1303.

### 2.1 Evaluation of Prior VSTL Testing

ES&S submitted the following test reports to NTS for reuse consideration. The reports and items requested for reuse are as follows:

- Wyle Test Report No. T71013.01-01 (DS200 Hardware Test Report for FL EVS 4.5.0.0)
  - Electrical Power Disturbance
  - Electromagnetic Radiation
  - Electrostatic Disruption
  - Electromagnetic Susceptibility
  - Electrical Fast Transient
  - Lightning Surge
  - Conducted RF Immunity
  - Magnetic Fields Immunity
  - Product Safety Review, UL60950-1
  - Temperature Power
  - High/Low Temperature
  - Humidity
  - Vibration
  - Bench Handling

- Wyle Test Report No. T71013.02-01 (ExpressVote Hardware Test Report for FL EVS 4.5.0.0)
  - Electrical Power Disturbance
  - Electromagnetic Radiation
  - Electrostatic Disruption
  - Electromagnetic Susceptibility
  - Electrical Fast Transient
  - Lightning Surge
  - Conducted RF Immunity
  - Magnetic Fields Immunity
  - Product Safety Review, UL60950-1
  - Temperature Power
  - High/Low Temperature
  - Humidity
  - Vibration
  - Bench Handling

For details of the acceptance of the above items, refer to Section 4.4.1 of this test plan.

### 2.2 Known Field Issues

The EVS 5.2.0.0 voting system is a modification to EVS 5.0.0.0 voting system. There are no published systemic issues traceable to the EVS family of systems.

## 3.0 MATERIALS REQUIRED FOR TESTING

The materials required for certification testing of the EVS 5.2.0.0 voting system include software, hardware, test materials, and deliverable materials were shipped directly to NTS by ES&S. The equipment used during this test is the same equipment used during the original certification campaign.

### 3.1 Software

Table 3-1 lists the software the manufacturer must submit for testing. This section lists all software required for operation and testing of the voting system being certified. This includes the software used for testing accuracy and system integration; as well as supporting software required for the test environment. All COTS software is listed in Appendix D.

**Table 3-1 EVS 5.2.0.0 Software Submitted for Testing**

| Software Required For Testing | Software Version |
|---|---|
| **Proprietary Software** | |
| ExpressVote | 1.4.0.0 |
| DS200 | 2.12.0.0 |
| AutoMARK | 1.8.6.0 |
| DS850 | 2.10.0.0 |
| 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 |
| ExpressPass Application* | 1.1.0.0 |

*ExpressPass Application software is not in the scope of certification, but NTS will review the source code for 2005 VVSG compliance.

### 3.2 Equipment

This subsection categorizes the equipment the manufacturer submitted for testing listed in Table 3-2. Each test element is included in the list of equipment required for testing of that element, including system hardware, general purpose data processing and communications equipment, and any required test instrumentation.

**Table 3-2 EVS 5.2.0.0 Voting System Equipment Description**

| Equipment | Description | Serial Numbers/Designation |
|---|---|---|
| ExpressVote<br>Hardware v. 1.0<br>Firmware v. 1.4.0.0 | Vote Capture Device | EV0113350021, EV0113350022<br>EV0113350025, EV0113350037<br>EV0113350052, EV0113350033,<br>EV0113350049 |
| DS200<br>Hardware v. 1.2.1<br>Firmware v. 2.12.0.0 | Precinct Count Digital Scanner | ES0108340026, DS0113340087 |
| DS200<br>Hardware v. 1.2.3<br>Firmware v. 2.12.0.0 | Precinct Count Digital Scanner | DS0113360186 |
| DS200<br>Hardware v. 1.3<br>Firmware v. 2.12.0.0 | Precinct Count Digital Scanner | DS0313350002, DS0313350010 |

## 3.0 MATERIALS REQUIRED FOR TESTING (Continued)

### 3.2 Equipment (Continued)

**Table 3-2 EVS 5.2.0.0 Voting System Equipment Description (Continued)**

| Equipment | Description | Serial Numbers/Designation |
|---|---|---|
| AutoMARK A100<br>Hardware v. 1.0<br>Firmware v. 1.8.6.0 | Accessible Voting Station | AM0106431607 |
| AutoMARK A200<br>Hardware v. 1.1<br>Firmware v. 1.8.6.0 | Accessible Voting Station | AM0308421809 |
| DS850<br>Hardware v. 1.0<br>Firmware v. 2.10.0.0 | Central Count Digital High Speed Scanner | DS850: DS8511090075<br>Cart: 549037-01<br>Laser Printer Oki B430dn:<br>AL03021036A0<br>UPS APC-RS 1500:<br>JB1103003923<br>Dot Matrix Printer Oki 420:<br>AE72011853C0 |
| Ballot Box<br>Hardware v. 1.2, 1.3 & 1.4 | Plastic Ballot Box | Box1; Box 2; Box 3; Box 4; Box 5; Box 01; Box 02; E089; B099 |
| Ballot Box<br>Hardware v. 1.0, 1.1, & 1.2 | Metal Box with Diverter | Box 12 |
| Server PC | Dell PowerEdge T410 | 4D6BQMI |
| Server PC | Dell PowerEdge T710 | JPZ6VR1 |
| Client PC | Dell OptiPlex 980 | 3TZJFQ1 |
| Client PC | Dell Latitude E6410 | 232F0M1 |
| Transport Media<br>(USB Flash Drives) | Delkin 1GB<br>Delkin 2 GB<br>Delkin 4GB<br>Delkin 8GB | NTS-assigned: TM-XXX |
| Compact Flash | Delkin Devices 1 GB Compact Flash | NTS-assigned: CF-XXX |
| Report Printer | OKI B6300 | LSQX074394 |
| Headphones | Avid FV 60 | HP-57936-1- 9 |
| ExpressPass Printer* | Thermal Bar Code Printer | Model 4200<br>S/N: 01901042505 |
| Quick Response (QR) Code Scanner | Motorola QR Code Scanner | Model DS9208<br>S/N: 14014000502091 |

*This equipment is not in the scope of certification. This equipment will be tested to ensure that it functions as stated in the TDP. No other testing will be performed on this equipment.

(The remainder of this page intentionally left blank)

## 3.0 MATERIALS REQUIRED FOR TESTING (Continued)

### 3.3 Deliverable Materials

The materials listed in Table 3-3 are to be delivered as part of the EVS 5.2.0.0 Voting System to the users.

**Table 3-3 Deliverable Materials**

| Deliverable Material | Version | Description |
|---|---|---|
| ExpressVote | Firmware 1.4.0.0; Hardware 1.0 | Vote Capture Device |
| 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 EV 60 | Stereo Headphones |
| QR Code Scanner | Motorola Model DS9208 | Bar code scanner |
| ElectionWare | 4.6.0.0 | EMS |
| ERM | 8.11.0.0 | 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 Previewer | 1.4.0.0 | EMS |
| EVS 5.2.0.0 Voting System Overview | 5.0 | TDP Document |
| EVS 5.2.0.0 System Functionality Description | 4.0 | TDP Document |
| ES&S ElectionWare Volume I: Administrator's Guide | 3.0 | TDP Document |
| ES&S ElectionWare Volume II: Define User's Guide | 3.0 | TDP Document |
| ES&S ElectionWare Volume III: Design User's Guide | 2.0 | TDP Document |
| ES&S ElectionWare Volume IV: Deliver User's Guide | 4.0 | TDP Document |
| ES&S ElectionWare Volume V: Results User's Guide | 2.0 | TDP Document |
| Election Reporting Manager User's Guide | 6.0 | TDP Document |
| ExpressVote Opererator's Guide | 1.4 | TDP Document |
| DS200 Opererator's Guide | 5.0 | TDP Document |
| DS850 Opererator's Guide | 4.0 | TDP Document |
| AutoMARK System Opererator's Guide | 4.0 | TDP Document |
| EVS 5.2.0.0 Network Setup Guide | 1.1 | TDP Document |
| ES&S EVS Event Logging Service User's Guide | 3.0 | TDP Document |
| EVS 5.2.0.0 Voting System Security Specification | 4.0 | TDP Document |
| EVS 5.2.0.0 Hardening Procedures for the Election System | 1.2 | TDP Document |

## 4.0 TEST SPECIFICATIONS

NTS personnel will perform modification testing of the EVS 5.2.0.0 in the configuration submitted to the EAC in application ESS1303. NTS personnel will ensure that all certification testing conducted on the manufacturer's voting system follows NTS' procedures for testing and that specific test cases are used to ensure the requirements of the EAC 2005 VVSG and EAC Testing and Certification Program Manual are met.

All RFI's and NOC's applicable as of the date of this document shall apply to this test campaign unless otherwise noted.

### 4.1 Requirements (Strategy of Evaluation)

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

**Section 2: Functional Requirements** – The requirements in this section will be tested during the FCA and System Integration tests utilizing the "NTS Baseline Test Cases" along with test cases specially designed for the ES&S EVS 5.2.0.0 per sections 4.4.3 and 4.4.4. The data input during these tests will be the predefined election definitions submitted as part of the test plan package.

**Section 3: Usability and Accessibility** – The requirements in this section will be tested during this test campaign on the ExpressVote. During this test campaign, the ExpressVote will be verified that it meets the Usability and Accessibility requirements of the 2005 VVSG.

**Section 5: Software Requirements** – The requirements in this section will be tested during source code review, TDP review, and FCA. A combination of review and functional testing will be performed to ensure these requirements are met.

**Section 7: Security Requirements** The requirements in this section will be tested during source code review, FCA, and security tests.

**Section 8: Quality Assurance (QA) Requirements** The requirements in this section shall be tested throughout the test campaign using various methods. A TDP review shall be performed on ES&S QA documentation to determine compliance to EAC 2005 VVSG requirements. All source code shall be checked to ensure that proper QA documentation has been completed. All equipment received for initial testing and follow-up testing shall be checked against ES&S documentation to ensure their QA process is being followed. NTS personnel will complete the requirements of EAC 2005 VVSG Vol. 2, Section 7, "Quality Assurance Testing" and Section 1.3.1.5, "Focus of Vendor Documentation" that requires NTS personnel to physically examine documents at ES&S's location or conduct an external evaluation utilizing equipment, documents, and support information provided by ES&S during the test campaign. NTS may also choose to interview ES&S's QA staff for further evaluation.

**Section 9: Configuration Management (CM) Requirements** – The requirements in this section shall be tested throughout the test campaign. The TDP review shall be performed on the ES&S configuration management documentation to determine EAC 2005 VVSG compliance and to further determine whether ES&S is following its documented CM requirements within the TDP. Any anomalies shall be formally reported to ES&S and the EAC. NTS personnel will conduct an audit of the ES&S CM Program at the ES&S facility at the conclusion of the test campaign.

**4.0 TEST SPECIFICATIONS (Continued)**

**4.1 Requirements (Strategy of Evaluation) (Continued)**

NTS personnel shall maintain a test log of the procedure(s) employed. This log identifies the system and equipment by model and serial number. In the event that the project engineer deems it necessary to deviate from NTS Test Cases or NTS Operating Procedures (OP) pertaining to the test environment, the equipment arrangement and method of operation, the specified test procedure, or the provision of test instrumentation and facilities shall be recorded in the test log. A discussion of the reasons for the deviation and the effect of the deviation on the validity of the test procedure shall also be completed by the Project Engineer and Program Manager.

NTS personnel utilize an internal bug tracking system in order to capture and track all issues and discrepancies found during the testing campaign. This allows for all issues and discrepancies to be monitored for reoccurrence, tracks the root cause analysis, and provides a resolution status. NTS personnel shall verify all items logged into the bug tracking system are resolved prior to the completion of testing and before any recommendation may be made for certification.

The specific NTS OPs to be used during testing include the following:

| | |
|---|---|
| OP 1 Operations Status Checks | OP 25 Physical Configuration Audit |
| OP 2 Receipt Inspection | OP 26 Functional Configuration Audit |
| OP 3 Technical Data Package Review | OP 27 Maintainability |
| OP 4 Test Plan Preparation *(This document)* | OP 28 Availability |
| OP 5a-d Source Code Review | OP 29 Electrical Supply |
| OP 6a-d Security | OP 30 System Integration Test |
| OP 7 Trusted Build | OP 34 Test Report |
| OP 22 Acoustic Test | OP 36 Vote Recording Requirements |
| OP 24-1a-g Usability | OP 40 Volume and Stress |
| OP 24-2a-h Accessibility | OP 41 Logic & Accuracy |

(The remainder of this page intentionally left blank)

## 4.0 TEST SPECIFICATIONS (Continued)

### 4.2 Hardware Configuration and Design

The EVS 5.2.0.0 voting system is a paper-based precinct voting system using touch-screen and scan technology to scan and validate ballots, provide voter-assisted ballots, and tabulate precinct results. The precinct counting device is the DS200 which is responsible for scanning, validating and tabulating voter ballots. EVS 5.2.0.0 voting system contains multiple voter assistance terminals. It can be configured with the AutoMARK Model A100, A200, A300, or ExpressVote to accommodate special needs voters. The DS850 central count is a high-speed digital scanner that processes large ballot batches at a central location. All EMS functions are handled by proprietary software running on COTS PC/laptops/servers which are listed in section 3.2. NTS has determined that these COTS PC/laptops/servers are not subject to hardware testing per the EAC 2005 VVSG, because all contained CE, UL, and FCC labeling. The Election Management System (EMS) is an application suite consisting of ElectionWare, Election Reporting Manager (ERM), Removable Media Service (RMS), ES&S Event Log Service (UELS), ExpressVote Previewer, and VAT Previewer.

Each unit will be loaded with the Operational Status Check election definition configured for early voting. This will allow all the data generated for the Pre-operational, Operational, and Post-operational test to be further analyzed, compiled and included in the Reliability and Availability Test results.

### 4.3 Software System Functions

The EVS 5.2.0.0 voting system software is comprised of multiple applications written in numerous languages. The system software is broken down into four areas: EMS, Precinct tabulator software acting as firmware, central count software running as firmware, and ADA device software running as firmware. The main components and their subcomponents are as follows:

- ElectionWare (Java)
- ElectionWare/SQL
- ElectionWare PaperBallot
- ERM
- Event Log Service
- Removable Media Service
- VAT Previewer
- ExpressVote Previewer
- DS200
- DS850
- AutoMARK
- ExpressVote

### 4.4 Test Case Design

NTS uses the V-Model Life Cycle as defined by the Institute of Electrical and Electronics Engineers (IEEE). The IEEE definition of the V-Model Life Cycle uses two concepts "Verification" and "Validation." NTS' test approach is to incorporate the use of both "Verification" and "Validation". There are four basic levels of testing in the V-Model Life Cycle: Component, Integration, System, and Acceptance. NTS will be evaluating the ES&S EVS 5.2.0.0 to all four levels.

(The remainder of this page intentionally left blank)

**4.0 TEST SPECIFICATIONS (Continued)**

**4.4 Test Case Design (Continued)**

**4.4.1 Hardware Qualitative Examination Design**

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

- Hardware Compliance Testing of the Election Systems & Software FL EVS 4.5.0.0 voting system DS200 Hardware Version 1.3, Wyle Test Report No. T71013.01-01
- Hardware Compliance Testing of the Election Systems & Software FL EVS 4.5.0.0 voting system ExpressVote Hardware Version 1.0, Wyle Test Report No. T71013.02-01

NTS personnel performed a hardware qualitative examination to 1) assess if the testing was performed under the guidelines of the EAC program, 2) assess if the tests were performed per the EAC 2005 VVSG, and 3) determine if the scope of the engineering changes were implemented since test performance. The results from this examination deemed that the hardware testing performed under the T71013.01-01 and T71013.02-01 campaigns were tested to the EAC 2005 VVSG and in accordance with the EAC Testing and Certification Program Manual. NTS recommends that reuse be approved for all hardware test requirements.

The summary of acceptable testing is provided in Table 4-1. NTS will verify all hardware during the PCA and those results will determine if the hardware is compliant with the previous tested versions. All testing that is deemed rejected shall be performed by NTS personnel under this test campaign. The details of those tests are presented in Section 6.0.

(The remainder of this page intentionally left blank)

**4.0 TEST SPECIFICATIONS (Continued)**

**4.4 Test Case Design (Continued)**

**4.4.1 Hardware Qualitative Examination Design (continued)**

**Table 4-1 Hardware Test Examination Results**

| Test/EAC 2005 VVSG Section | Procedure/Description | EVS 5.2.0.0 Voting System Component | |
|---|---|---|---|
| | | ExpressVote HW 1.0 | DS200 HW 1.3 |
| *Electromagnetic Radiation/4.1.2.9* | FCC Part 15 Class B for both radiated and conducted emissions | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Low Temperature/4.1.2.14* | MIL-STD-810D minimum temperature shall be -4 degrees F | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Vibration/4.1.2.14* | MIL-STD-810D, Method 514.3 physical shock and vibration during handling and transport | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Lightning Surge/4.1.2.7* | IEC 61000-4-5 (1995-02) | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *High Temperature/4.1.2.14* | MIL-STD-810D, Method 501.2 maximum temperature shall be 140 degrees F | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Bench Handling* | MIL-STD-810D, Method 516.3 Procedure VI six 4" drops on each edge totaling 24 drops | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Electrical Fast Transient/4.1.2.6* | IEC 61000-4-4 (2004) | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Humidity Test/4.1.2.14* | MIL-STD-810D, Method 501.2 ten 24 hour humidity cycles | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Electrostatic Disruption/4.1.2.8* | IEC 61000-4-2 (1995-01) 15kV air discharge and 8kV contact discharge | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Electromagnetic Susceptibility/4.1.2.10* | IEC 61000-4-3 (2006) electromagnetic field of 10V/m modulated by a 1kHZ, 80% AM modulation at 80MHz to 1000MHz frequency | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Conducted RF Immunity/4.1.2.11* | IEC 61000-4-6 (1996-04) conducted radio frequency energy | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Magnetic Fields Immunity/4.1.2.12* | IEC 61000-4-8 (1993-06) AC magnetic fields of 30 A/m at 60Hz | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Electrical Power Disturbance/4.1.2.5* | IEC 61000-4-11 (1994-06) power surges and dips | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Temperature/Power Variation/4.1.2.13* | MIL-STD-810D, Method 502.2 and Method 501.2 163 hours at 50 degrees to 95 degrees | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |
| *Safety/4.3.8* | UL 60950-1 product safety review | Accept FL EVS 4.5.0.0 | Accept FL EVS 4.5.0.0 |

(The remainder of this page intentionally left blank)

4.0 TEST SPECIFICATIONS (Continued)

4.4 Test Case Design (Continued)

4.4.2 Hardware Environmental Test Case Design

The EVS 5.2.0.0 voting system hardware was tested by NTS' EMI, Dynamics, and Environmental test facilities for testing to the hardware requirements in accordance with NTS' A2LA certifications 845.01-.03. All EMI testing was performed, per the following NTS Test Guidelines Documents: EMI-001A, "NTS' 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." All hardware testing was per the guidelines of ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements," and ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment", and the governing MIL-STD. All pre/post tests were conducted by qualified NTS personnel at the NTS Huntsville, AL, facility.

4.4.3 Software Module Test Case Design and Data

NTS personnel implements Component Level Testing during the FCA for each component and subcomponent exercising the functionality of each as designed and documented. NTS will utilize limited structural-based techniques (white-box testing) mainly in the area of Source Code Review, Compliance Builds, and Security Testing and Review. NTS will depend heavily on specification-based techniques (black-box testing) for the individual software components. The most common specification-based techniques applied to the ES&S EVS 5.2.0.0 during software testing will be "equivalence partitioning" and "boundary value testing."

- "Equivalence partitioning" will be used to evaluate specific software functions and data entry points of the EVS 5.2.0.0 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.

NTS personnel will document an expected result for each test. The ACCEPT/REJECT criteria at the Component Level will be based on the expected result. If the System Under Test (SUT) performs as expected, the results will be accepted. If the SUT does not perform as expected, the test will be evaluated for tester errors, test procedure errors, or test equipment errors. If it is determined there were no tester errors, test procedure errors, or test equipment errors, the test will be repeated in an attempt to reproduce the results. If the results can be reproduced and the expected results are not met, the SUT will have failed the test. If the results cannot be reproduced, the manufacturer and VSTL will determine the root cause of the error. If the root cause has been corrected and the SUT performs as expected, then the results will be accepted. If the root cause cannot be determined, the problem has not been corrected, or the SUT still does not perform as expected, the SUT will have failed the test.

4.0 TEST SPECIFICATIONS (Continued)

4.4 Test Case Design (Continued)

4.4.3 Software Module Test Case Design and Data (Continued)

NTS personnel will document the error and track the error through resolution. NTS personnel will not move to the next level of testing until all documented errors are resolved to try and minimize errors that might occur farther along in the test campaign. Engineering analysis will be performed to determine what effect the resolution has on the component. A determination will be made whether Regression Testing will be sufficient or a complete re-test is necessary.

4.4.4 Software Functional Test Case Design and Data

The test approach to be used for the ES&S EVS 5.2.0.0 will be a bottom-up approach where the lower-level components will be tested first and then used to facilitate the testing of higher-level components. The specification-based technique used by NTS personnel at the Integration Level is "Use Case." The actors that have been identified to use the ES&S EVS 5.2.0.0 are:

- Election Administrator – The actor with responsibility of entering the election definition with translation and audio. This actor is also responsible for maintaining EMS users and the election database.
- Warehouse Technician-The actor responsible for loading the election definition onto DS200, AutoMARK, ExpressVote, and DS850. This actor also runs diagnostic test and maintains the units.
- Poll Worker-The actor at the precinct location to set up and close down the DS200, AutoMARK, EspressVote and DS850 on election day.
- Voter-The actor who physically casts the ballot on election day.
- ADA Voter-The actor with special needs who has to vote unassisted on election day.
- Election Official-The actor who reports and audits the election result post-election day.

"Use Case" will be 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.

If an error occurs between data interfaces or in the process flow, an engineering analysis will be performed to determine if the error is data, process, or tester error. The ACCEPT/REJECT criteria for integration level testing is whether the components and applications interface using the documented process for each actor. If there is an error interfacing between components, the error shall be documented and tracked through resolution. Engineering analysis shall be performed to determine what effect the resolution has on the component. A determination will be made whether regression testing will be sufficient or a complete re-test is necessary.

4.0 TEST SPECIFICATIONS (Continued)

4.4 Test Case Design (Continued)

4.4.5 System Level Test Case Design

During system level testing, NTS personnel will test the ability of proprietary software, hardware, and peripherals in addition to the COTS software, hardware, and peripherals as a complete system in a configuration of the systems for intended use. The EVS 5.2.0.0 voting system is intended to support both large and small jurisdictions. NTS personnel's approach for the EVS 5.2.0.0 voting system will be to execute System Level Testing with a variety of elections that include various combinations of jurisdictions, parties, and ballot styles.

The ACCEPT/REJECT criteria for system level testing is whether the system can continue in testing. The two scenarios are: ACCEPT or REJECT. ACCEPT is 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 testing. REJECT is 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 EVS 5.2.0.0 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.

An engineering analysis shall be performed to determine what effect the resolution has on the system. A determination shall be made by NTS senior level engineers whether regression testing shall be sufficient or a complete re-test is necessary.

NTS personnel will implement acceptance level testing focusing on all the data collected during the entire test campaign along with performing the "Trusted Build" for the system. All data from hardware testing, software testing, functional testing, security testing, volume testing, stress testing, telecommunication testing, usability testing, accessibility testing, and reliability testing activities will be combined to ensure all functions supported by the EVS 5.2.0.0 voting system have been tested. The EAC 2005 VVSG requirements will be checked against the test data to ensure all applicable requirements are met. Items not supported by the EVS 5.2.0.0 voting system will be documented. Any issues documented during testing will be resolved or annotated in the test report.

NTS personnel will test every EAC 2005 VVSG requirement impacted by the EVS 5.2.0.0 voting system modification. NTS personnel will report all issues discovered during this test campaign to ES&S and the EAC. If NTS determines there is not enough data to ensure a requirement was met, the test plan will be altered and further testing will be done. The EAC has the final decision as to whether the system meets all the requirements for an EAC-certified system. NTS will either recommend approval, if the system meets all applicable sections of the VVSG, or recommend disapproval if the system does not meet all applicable sections of the VVSG.

(The remainder of this page intentionally left blank)

## 4.0 TEST SPECIFICATIONS (Continued)

### 4.5 Security Functions

The purpose of security testing shall be to evaluate the effectiveness of the EVS 5.2.0.0 voting system in detecting, preventing, logging, reporting, and recovering from any security risks identified by simulating attacks on the system; NTS personnel have developed internal operating procedures to evaluate the EVS 5.2.0.0 voting system to the security requirements set forth in the EAC 2005 VVSG. These procedures have been specifically tailored to assess the EVS 5.2.0.0 voting system to the applicable requirements. NTS personnel will attempt to defeat the access controls and physical security measures documented in the ES&S technical data package. A threat matrix shall be created to determine the risks and vulnerabilities.

NTS personnel will utilize a combination of functional testing, source code review, and Fortify SCA to evaluate the EVS 5.2.0.0 voting system. NTS personnel will report all issues discovered during this test campaign to ES&S and the EAC. A report containing all findings shall be issued to the EAC as an addendum to the final test report.

### 4.6 TDP Evaluation

NTS qualified personnel will perform a comprehensive review of the ES&S TDP to determine compliance to the EAC 2005 VVSG requirements and ES&S specific requirements.

NTS qualified personnel utilize a TDP Review Matrix which lists every EAC 2005 VVSG requirement pertaining to TDP review. NTS qualified personnel will record the results of the review of each document to the applicable requirements listed in the TDP Review Matrix.

During the TDP review process, each document will be reviewed for completeness, clarity, correctness, and continuity. The review results will be formally reported to ES&S. 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 numerous other tests. At the end of the TDP review process, a Discrepancy Report will be issued listing the non-compliant items on a document-by-document basis, if applicable. A listing of all documents contained in the EVS 5.2.0.0 voting system TDP is provided in Table 4-2.

(The remainder of this page intentionally left blank)

4.0 TEST SPECIFICATIONS (Continued)

4.6 TDP Evaluation (Continued)

Table 4-2 EVS 5.2.0.0 Voting System TDP Documents

| EVS 5.2.0.0 TDP Documents | Version | Doc No. | Document Code |
|---|---|---|---|
| *System Overview* | | | |
| Voting System Overview | 9.0 | 01-01 | EVS5200_C_D_0100_SysOvr |
| *System Functionality Description* | | | |
| System Functionality Description – Voting System | 6.0 | 02-01 | EVS5200_C_D_0200_SFD |
| *System Hardware Specification* | | | |
| System Hardware Specification – DS200 Hardware Revision 1.2 | 3.0 | 03-01 | DS200HW_M_SPC_0312_HWSpec |
| System Hardware Specification – DS200 Hardware Revision 1.3 | 4.0 | 03-02 | DS200HW_M_SPC_0313_HWSpec |
| System Hardware Specification – DS850 | 1.1 | 03-03 | DS850IIW_M_SPC_0310_IIWSpec |
| ExpressVote Hardware Specification | 3.0 | 03-04 | ExpressVoteIIW_M_SPC_0310_IIWSpec |
| AutoMARK System Hardware Overview | 3.0 | 03-05-01 | AutoMARK_ESS_System_Hardware_Overview_AQS-18-5002-000-S |
| AutoMARK System Hardware Specification | 3.0 | 03-05-02 | AutoMARK_ESS_System_Hardware_Specification_AQS-18-5000-001-F |
| *Software Design and Specification* | | | |
| Software Design and Specification – ES&S Event Log Service | 1.0 | 04-01 | EVS5200_SDS00_ELS |
| Software Design and Specification - ElectionWare | 2.0 | 04-02 | EVS5200_SDS00_Electionware |
| Software Design and Specification – ERM | 2.0 | 04-03 | EVS5200_SDS00_ERM |
| ES&S Software Design Specifications ERM Appendices | 2.0 | 04-03-01 | EVS5200_SDS00_ERM01_Appendices |
| Software Design and Specification – DS850 | 2.0 | 04-04 | EVS5200_SDS00_DS850 |
| DS200 Software Design and Specification | 4.0 | 04-05 | EVS5200_D_SDS00_DS200 |
| ExpressVote Software Design and Specification | 3.0 | 04-06 | EVS5200_D_SDS00_ExpressVote |
| Software Design and Specification – AutoMARK | 1.8 | 04-07 | AutoMARK_ESS_Software_Design_Specifications_Overview |
| AutoMARK Operating Software Design Specifications | 5.0 | 04-07-01 | AQS-18-5001-002-R |
| AutoMARK Ballot processing Specifications | 3.0 | 04-07-01 | AQS-18-5002-003-S |
| AutoMARK Software Design Specifications | 5.0 | 04-07-01 | AQS-18-5001-004-S |
| AutoMARK Software Development Environment | 5.0 | 04-07-01 | AQS-18-5001-006-R |
| AutoMARK Graphical User Interface Specifications | 6.0 | 04-07-01 | AQS-18-5001-005-R |
| AutoMARK Software Diagnostics Specifications | 5.0 | 04-07-01 | AQS-18-5000-004-F |
| AutoMARK Embedded Database Interface Specifications | 5.0 | 04-07-01 | AQS-18-5002-005-S |
| AutoMARK Ballot Scanning and Printing Specifications | 5.0 | 04-07-01 | AQS-18-5002-007-S |
| AutoMARK Driver API Specifications | 5.0 | 04-07-01 | AQS-18-5000-002-F |
| AutoMARK Programming Specifications Details | 5.0 | 04-07-01 | AQS-18-5001-011-R |

**4.0 TEST SPECIFICATIONS (Continued)**

**4.6 TDP Evaluation (Continued)**

**Table 4-2 EVS 5.2.0.0 Voting System TDP Documents (Continued)**

| EVS 5.2.0.0 TDP Documents | Version | Doc No. | Document Code |
|---|---|---|---|
| *Software Design and Specification continued)* | | | |
| AutoMARK ESS Software Standards Specification | 5.0 | 04-07-01 | AQS-18-4000-000-S |
| AutoMARK ESS Operations and Diagnostic Log Specs | 5.0 | 04-07-01 | AQS-18-5002-004-S |
| ES&S System Development Program | 2.0 | 04-08 | ESSSYS_SG_P_0400_ SystemDevProgram |
| Coding Standards | 3.0 | 04-09 | ESSSYS_D_P_0400_CodingStandards |
| *System Test/Verification Specification* | | | |
| Voting System Test Plan ES&S Voting System 5.2.0.0 | 2.0 | 05-01 | EVS5200_QA_D_0500_SysTestPlan |
| CIF Usability Test Reports ExpressVote | 1.0 | 05-02-01 | ExpressVoteHW_P_D_0509_ CIFRptExpressVote |
| ES&S AutoMARK Voter Assist Terminal (VAT) | 1.x | 05-02-02 | AMVATHW_P_D_0510_CIFRptAMVAT |
| DS200 Precinct Ballot Scanner | 1.2.1 | 05-02-03 | DS200HW_P_D_0512_CIFRptDS200 |
| *System Security Specification* | | | |
| Voting System Security Specification | 4.0 | 06-01 | EVS5200_CM_SPC00_SysSecuritySpec |
| Hardening Procedures for the Election System | 1.2 | 06-02 | EVS5200_CM_SPC01_ HardeningProcedures |
| Security Script Description | 1.1 | 06-03 | EVS5200_CM_SPC02_SecScriptDesc |
| AutoMark System Security Specifications | 6.0 | 06-04 | AutoMARK ESS System Security Specification AQS-18-5002-001-S |
| *System Operations Procedure* | | | |
| Network Setup Guide | 1.2 | 07-01 | EVS5200_CM_SOP_ NetworkConfigGuide |
| AutoMARK System Operator's Guide | 4.0 | 07-02 | EVS5200_DOC_SOP_AMVAT |
| DS200 Operator's Guide | 6.00 | 07-03 | EVS5200_DOC_SOP_DS200 |
| DS850 Operator's Guide | 4.0 | 07-04 | EVS5200_DOC_SOP_DS850 |
| EVS Event Logging Service | 3.0 | 07-05 | EVS5200_DOC_SOP_ELS |
| Election Reporting Manager User's Guide | 7.0 | 07-06 | EVS5200_DOC_SOP_ERM |
| Electionware Volume I: Administrator's Guide | 4.0 | 07-07 | EVS5200_DOC_SOP_EW01Admin |
| Electionware Volume II: Define User's Guide | 5.0 | 07-08 | EVS5200_DOC_SOP_EW02Define |
| Electionware Volume III: Design User's Guide | 3.0 | 07-09 | EVS5200_DOC_SOP_EW03Design |
| Electionware Volume IV: Deliver User's Guide | 4.0 | 07-10 | EVS5200_DOC_SOP_EW04Deliver |
| Electionware Volume V: Results User's Guide | 3.0 | 07-11 | EVS5200_DOC_SOP_EW05Results |
| ExpressPass Operator's Guide | 4.0 | 07-12 | EVS5200_DOC_SOP_ExpressPass |
| ExpressVote Operator's Guide | 4.0 | 07-13 | EVS5200_DOC_SOP_ExpressVote |
| *System Maintenance Manuals* | | | |
| AutoMARK System Maintenance Manual | 2.1 | 08-01 | EVS5200_DOC_SMM_AMVAT |
| DS200 Maintenance Guide | 2.0 | 08-02 | EVS5200_DOC_SMM_DS200 |
| DS850 Maintenance Guide | 3.0 | 08-03 | EVS5200_DOC_SMM_DS850 |
| ExpressVote Maintenance Guide | 2.3 | 08-04 | EVS5200_DOC_SMM_ExpressVote |
| *Personnel Deployment and Training* | | | |
| Personnel Deployment and Training Program | 3.0 | 09-01 | ESSSYS_T_D_0900_TrainingProgram |
| *Configuration Management Plan* | | | |
| Configuration Management Plan | 2.0 | 10-1 | ESSSYS_CM_P_1000_CMProgram |
| ES&S Technical Documentation Program | 5.0 | 10-2 | ESSSYS_DOC_P_1000_TDProgram |

4.0 TEST SPECIFICATIONS (Continued)

4.6 TDP Evaluation (Continued)

Table 4-2 EVS 5.2.0.0 Voting System TDP Documents (Continued)

| EVS 5.2.0.0 TDP Documents | Version | Doc No. | Document Code |
|---|---|---|---|
| *QA Program* | | | |
| Manufacturing Quality Assurance Plan | 2.0 | 11-01 | ESSSYS_M_P_1100_MNFQuality AssurancePlan |
| ES&S 1.3 Hardware DS200 Acceptance Checklist | A | 11-01-01 | 1 3 Hardware DS200_AcceptChklst_001RevA |
| DS850 Acceptance checklist | D | 11-01-01 | 850_AcceptChklst_revD |
| DS850 Onsite Acceptance Checklist | B | 11-01-01 | 850_OAcceptChklst_revB |
| Acceptance Checklist AutoMARK Voter Assist Terminal | A | 11-01-01 | AutoMark_AcceptChklst_001_Rev A |
| AutoMARK QC Checklist | A | 11-01-01 | AutoMark_QC_Chklst_001Rev A |
| ES&S DS200 Acceptance Checklist | D | 11-01-01 | DS200_AcceptChklst_001RevD |
| ES&S ExpressVote Acceptance Checklist | B | 11-01-01 | ExpressVote_AcceptChecklst_001Rev B |
| Software Quality Assurance Program | 2.0 | 11-02 | ESSSYS_QA_P_1100_SoftwareQuality AssuranceProgram |
| ES&S Software/Firmware Acceptance | 2.0 | 11-02-01 | ESSSYS_QA_L_1100_SoftwareFirmware Acceptance |
| *System Change Notes* | | | |
| System Change Notes | 10.0 | 12-01 | EVS5200_DOC_D_1200_ChangeNotes |
| *Other TDP Documents* | | | |
| ES&S Ballot Production Guide | 2.1 | 13-01 | EVS5200_DOC_SOP_11_BPG |

(The remainder of this page intentionally left blank)

4.0 TEST SPECIFICATIONS (Continued)

4.7 Source Code Review

The strategy for evaluating EVS 5.2.0.0 will be based on the source code of the previously identified modifications to the system. All code changes from EVS 5.0.0.0 will be reviewed to the EAC 2005 VVSG coding standards and the manufacturer-supplied coding standards located within the TDP under ESSSYS_D_D_0100_Coding Standards.

As the source code is received, a SHA256 hash value will be created for each source code file. NTS source code team will conduct a manual line by line review for every line of modified or new source code for acceptance for all languages other than Java. For applications written in Java, NTS personnel will utilize automated tools (Checkstyle and NetBeans) to augment source code review. NTS personnel will perform a manual 10% review of all automated source code review. This is done to verify compliance of EAC 2005 VVSG coding standards and manufacturer supplied coding standards. Each identified violation shall be recorded by making notes of the standards violation along with directory name, file name, and line number

A technical report of all identified violations will be sent to ES&S for resolution on a regular basis. All revised source code will be checked for corrections until the final issue is resolved. At the end of the Source Code review process, a Discrepancy Report will be issued listing all non-compliance, to the EAC and ES&S. The results will be included in the final test report.

A "Compliance Build" shall be performed by NTS qualified personnel from the reviewed source code using the Compliance Build Procedure throughout the test campaign. This process follows the documented procedures of a "Trusted Build" in the EAC Testing and Certification Program Manual, Version 1.0, but differs from a Trusted Build 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 final step in the source code review shall be to create a Trusted Build from the reviewed source code. The Trusted Build will be performed by completing the following tasks in the order listed:

1. Clean the build machine of existing software
2. Retrieve the compliant source code
3. Construct the build environment
4. Create digital signatures of the build environment
5. Load the compliant source code into the build environment
6. Create a digital signature of the pre build environment
7. Create a disk image of the pre-build environment
8. Build executable code
9. Create a digital signature of executable code
10. Create a disk image of the post-build environment
11. Build installation media
12. Create a digital signature of the installation media
13. Install executable code onto the system and validate the software/firmware
14. Deliver source code with digital signature, disk image of pre-build environment with digital signatures, disk image of post-build environment with digital signatures, executable code with digital signatures, and installation media with signatures to the EAC Approved Repository.

(The remainder of this page intentionally left blank)

4.0 TEST SPECIFICATIONS (Continued)

4.7 Source Code Review (Continued)

The "Trusted Build" for the ES&S EVS 5.2.0.0 includes source code, data, and script files, in clear text form. The build also includes COTS software on commercially available media, COTS software downloaded by the VSTL, COTS software verified by SHA256 from the software supplier, and picture and sound files in binary format provided by ES&S. The first step of the process is to clean the hard drives by writing data to every spot on the hard drive, so the drive is cleared of existing data. The appropriate operating system will then be loaded and the applications from the VSTL reviewed source files along with the VSTL verified COTS software will be built. The final step is installing the applications on the hardware.

4.8 QA and CM System Review

Both the ES&S QA Plan and CM Plan will be reviewed. 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 ES&S documentation. Also, the ES&S TDP documentation package will be reviewed to determine if the ES&S QA Plan and the CM Plan are being followed. The results of the TDP review 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 ES&S for resolution.

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

5.2 Test Data Criteria

NTS personnel will evaluate all test results against the ES&S provided technical documentation for EVS 5.2.0.0 and the requirements set forth in the EAC 2005 VVSG. The acceptable range for system performance and the expected results for each test case shall be derived from the EVS 5.2.0.0 documentation. 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).

5.3 Test Data Reduction

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

## 6.0 TEST PROCEDURES AND CONDITIONS

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

### 6.1 Facility Requirements

All testing will be conducted at NTS Huntsville, AL facility unless otherwise annotated. 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 ANSI/NCSL Z540-1 and ISO 10012-1.

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

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

- Temperature: 68 to 75 degrees Fahrenheit (± 4°F)
- Relative Humidity: 20 to 90%
- Atmospheric Pressure: Local Site Pressure

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

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

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.

(The remainder of this page intentionally left blank)

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.2 Test Set-Up

All voting machine equipment (hardware and software), shall be received and documented utilizing NTS' Receiving Ticket (WI.-218, Nov. '85) and proper QA procedures. When voting system hardware is received, NTS personnel will notify NTS QA personnel. With NTS QA personnel present, each test article will be unpacked and inspected for obvious signs of degradation and/or damage that may have occurred during transit. Noticeable degradation and/or damage, if present, shall be recorded, photographed, and the ES&S Representative shall be notified. NTS QA personnel shall record the serial numbers and part numbers. Comparison shall be made between those numbers recorded and those listed on the shipper's manifest. Any discrepancies noted shall be brought to the attention of the ES&S representative for resolution. All TDP and source code modules received will be inventoried and maintained by the NTS Project Engineer 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 personnel will properly configure and initialize the system, and verify that it is ready to be tested by following the procedures detailed in the EVS 5.2.0.0 voting system technical documentation. NTS personnel will develop an Operational Status Check to be performed prior to and immediately following each hardware test. NTS personnel will develop the system performance levels to be measured during operational tests.

NTS personnel have developed eight election definitions that shall be used during this test campaign:

**Operational Status Check**

This election definition will be used to verify that the equipment operates properly prior to and immediately following the execution of all tests.

**Accuracy**

The accuracy test ensures that each component of the voting system can process 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The accuracy test is designed to test the ability of the system to capture, record, store, consolidate and report specific selections and absences of a selection. The required accuracy is measured as an error rate. This rate is the maximum number of errors allowed while processing a specified volume of data. For paper-based voting systems, the ballot positions on a paper ballot must be scanned to detect selections for individual candidates and contests and the conversion of those selections detected on the paper ballot converted into digital data.

(The remainder of this page intentionally left blank)

6.0 TEST PROCEDURES AND CONDITIONS (Continued)

6.2 Test Set-Up (Continued)

General Election: GEN-01

The 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.

The parameters of this election are listed below:

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

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

- Audio input in an alternative language for basic voting pattern using an ADA device
- Audio input for write-in voting using an ADA device
- Spanish language input for a basic voting pattern
- Input for write-in voting using Spanish language

(The remainder of this page intentionally left blank)

6.0 TEST PROCEDURES AND CONDITIONS (Continued)

6.2 Test Set-Up (Continued)

General Election: GEN-02

The 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.

The parameters of this election are listed below:

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

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

- Early voting election with at least one unit in all precincts
- Voting options for over-voting
- Voting options for under-voting
- Spanish language ballots
- Audio ballots utilizing ADA capabilities

(The remainder of this page intentionally left blank)

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.2 Test Set-Up (Continued)

**General Election: GEN-03**

The 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.

The parameters of this election are listed below:

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

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

- Spanish language ballot with a basic voting pattern and write-in candidates
- Spanish audio input to simulate ADA device with write-in option
- Character based language with basic voting pattern
- Character based language utilizing an ADA option
- Binary input to support ADA option
- Binary input to support ADA audio device

(The remainder of this page intentionally left blank)

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.2 Test Set-Up (Continued)

**Primary Election: PRIM-01**

The 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.

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: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: Yes
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

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

- Alternative language utilized with a write-in option
- ADA audio device utilized with a write-in option

(The remainder of this page intentionally left blank)

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.2 Test Set-Up (Continued)

Primary Election: PRIM-02

The 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.

The parameters of this election are listed below:

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

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

- Open primary election with at least one machine in each precinct
- Voting options for over-voting
- Voting options for under-voting
- Voting option for write-ins
- Spanish language ballot
- Voting option utilizing AIDA audio device

(The remainder of this page intentionally left blank)

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.2 Test Set-Up (Continued)

Primary Election: PRIM-03

The 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.

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: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: No
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

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

- Spanish ballot with basic voting pattern and write-in option
- Spanish language ballot using ADA audio device with write-n option
- Character based language ballot with basic voting pattern
- Character based language utilizing ADA device
- Binary input to support ADA option
- Binary input to support ADA audio device

(The remainder of this page intentionally left blank)

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.3 Test Sequence

The components of the EVS 5.2.0.0 voting system will undergo testing to verify that the modification performs as described by USS and meets the requirements of the 2005 VVSG. The following sections provide a list of each test and a brief description of each test. NTS personnel will utilize a combination of functional testing and TDP reviews to evaluate the system performance. (The tests are not in a specific sequence.)

#### 6.3.1 Hardware Test Descriptions

All of the hardware tests have been previously performed during prior VSTL test campaigns with the exception of the following:

- Electrical Supply
- Maintainability

These tests will be performed during this test campaign.

#### 6.3.2 Software Test Descriptions

The software tests include the following:

Source Code Compliance Review – NTS qualified personnel will compare the source code to the manufacturer's software design documentation to ascertain how completely the software conforms to the manufacturer's specifications. A listing of the TDP documents for Software Design and Specification can be found in Table 4-2 of this document. Source code inspection shall also assess the extent to which the code adheres to the requirements in Section 5 of the EAC 2005 VVSG Volumes I and II.

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

COTS Source Code Review – Unmodified, general purpose COTS non-voting software (e.g., operating systems, programming language compilers, database management systems, and web browsers) is not subject to the detailed examinations specified in this section; however, NTS personnel will examine such software to ensure that the specific version of software being used is identical to the design specification in order to confirm that the software has not been modified. NTS will verify by downloading the software directly from the manufacturer site, verifying against NRSL, or by being provided original OEM discs.

If there is COTS generated software source code, NTS qualified personnel will inspect the COTS generated software source code in preparation of test plans and to provide some minimal scanning or sampling to check for embedded code or unauthorized changes. For purposes of code analysis, the COTS units shall be treated as unexpanded macros. These will be identified in the Test Report.

The portions of COTS software that have been modified by the manufacturer in any manner are 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 personnel to enable review.

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.3.2 Software Test Description (Continued)

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

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

Security Source Code Review – The security source code review is a detailed review of the functionality of the source code that has been submitted. A manual line by line review will be performed for all programming languages except Java. A manual line by line or an automated (Checksyle and Netbeans) review will be performed on Java.

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

**Table 6-1 EVS 5.2.0.0 Voting System Software Test Sequence**

| Test | Description | Procedure | Test Level | Specimen |
|---|---|---|---|---|
| *Technical Data Package (TDP) Review* | Documentation review for compliance, correctness, and completeness | WHVS07.1 OP 3 | Document | TDP package |
| *Compliance Source Code Review* | Source code review for compliance | WHVS07.2 OP 5a | Component | Source Code |
| *Physical Configuration Audit* | Audit hardware and software models and versions | WHVS07.3 OP 25 | Component & System | System hardware and software |
| *Compliance Build* | Using the build documents and source code to construct the EMS | WHVS07.3 OP 25 | Component | Source Code |
| *Functional Configuration Audit* | Functional testing to the system documentation and EAC 2005 VVSG requirements | WHVS07.4 OP 26 OP30a | Component & Integration | System |
| *Source Code COTS Review* | Source code review to examine 3rd party products for modification and versions | WHVS07.2 OP 5d | Component | COTS Source Code |
| *Baseline OS* | RFI 2008-03 OS Configuration | WHVS07.3 OP 25 | Component | NIST SCAP FDCC Checklist |
| *Source Code Functional Review* | Source code review for functionality and high level software design | WHVS07.2 OP5b | Component & Integration | Source Code |
| *Source Code Security Review (manual)* | Source code review for specific security concerns augmented by an automated review | WHVS07.2 OP5d OP 6a | Component & Integration | Source Code |
| *Trusted Build* | Creation and installation of the final system software | WHVS07.6 OP 7, OP 7a | Component | System software |

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.3.3 System Testing

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

- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system
- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification
- If the hardware is non-COTS, NTS 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

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 insure all 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 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.

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

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

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.3.3 System Testing (Continued)

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

Accuracy – The accuracy test ensures that each component of the voting system can each process 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The Accuracy test is designed to test the ability of the system to "capture, record, store, consolidate and report" specific selections and absences of a selection. The required accuracy is defined as an error rate. This rate is the maximum number of errors allowed while processing a specified volume of data. For paper-based voting systems the ballot positions on a paper ballot must be scanned to detect selections for individual candidates and contests and the conversion of those selections detected on the paper ballot converted into digital data.

In an effort to achieve this and to verify the proper functionality of the units under test, the following methods will be used to test components of the voting system:

The accuracy requirements for the DS200 will be met by the execution of the standard accuracy test.
The DS200 will be tested by utilizing a combination of hand marked (70%) and pre-marked (30%) ballots to achieve accuracy rate greater than 1,549,703 correct ballot positions.

The accuracy requirements for the ExpressVote will be met by the execution of an accuracy test developed for the ExpressVote. The ExpressVote will be tested by utilizing a combination of blank vote cards (90%) and vote cards containing pre-printed activation bar codes by the ExpressPass (10%) to achieve accuracy rate greater than 1,549,703 correct ballot positions.

Volume/Stress/Reliability – Tests to investigate the system's response to conditions that tend to overload the system's capacity to process, store, and report data. The test parameters will focus on the system's stated limits and the ballot logic for areas such as the maximum number of active voting positions, maximum number of ballot styles, maximum candidates, maximum contests, and stated limits within the EMS. This test will be utilized to ensure the system can achieve the manufacturer's TDP claims of what the system can support. Testing will be performed by exercising an election definition and test cases developed specifically to test for volume and stress conditions of the system being tested.

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

Additionally, the system shall be configured exactly as it would for normal field use. 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. NTS personnel will properly configure and test the system by following the procedures detailed in the EVS 5.2.0.0 voting system technical documentation.

(The remainder of this page intentionally left blank)

## 6.0 TEST PROCEDURES AND CONDITIONS (Continued)

### 6.3.3 System Testing (Continued)

Regression Testing - Regression Testing will be performed on all system components to verify all functional and firmware modifications made during the test campaign did not adversely affect the system and its operation.

NTS will verify the audit log records for error and exception activity to verify proper documentation and recovery action for all functional tests performed. A detailed listing of all audit log entries shall be provided by ES&S in the TDP submitted. During testing, audit log entries will be compared to this list to ensure that all expected events were recorded. To ensure the system's ability to gracefully shutdown and recover from error conditions, negative test cases will be performed to introduce such error conditions. The error conditions introduced will be based on the system limits specified within the vendors TDP documentation.

Additional Capabilities - Appendix B describes additional capabilities associated to the EVS 5.2.0.0 voting system. Limited testing will be performed during functional testing.

## 7.0 TEST OPERATIONS PROCEDURES

### 7.1 Proprietary Data

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

# APPENDIX A

## ES&S PROJECT SCHEDULE

Appendix A Page No. 2 of 2
Certification Test Plan T71379.01

| ID | Task Name | Duration | Start | Finish | Predecessors |
|---|---|---|---|---|---|
| 1 | CAC Application and Approval | 3 days | Fri 12/13/13 | Tue 12/17/13 | |
| 2 | Wyle Receive Equipment | 2 days | Wed 12/18/13 | Thu 12/19/13 | 1 |
| 3 | Test Plan | 61 days | Wed 1/1/14 | Fri 3/28/14 | |
| 4 | Test Plan Development | 20 days | Wed 1/1/14 | Wed 1/29/14 | 1 |
| 5 | Test Plan to ES&S for Review | 3 days | Thu 1/30/14 | Mon 2/3/14 | 4 |
| 6 | Test Plan Update | 3 days | Tue 2/4/14 | Thu 2/6/14 | 5 |
| 7 | CAC Review | 21 days | Fri 2/14/14 | Mon 3/17/14 | 2 |
| 8 | Wyle Review and Update | 5 days | Tue 3/18/14 | Mon 3/24/14 | 7 |
| 9 | CAC Approval of Test Plan | 4 days | Tue 3/18/14 | Fri 3/28/14 | 7 |
| 10 | ES&S SCAP Submittal | 12 days | Tue 12/17/13 | Fri 1/10/14 | |
| 11 | Source Code Review | 5 days | Tue 12/17/13 | Mon 12/23/13 | |
| 12 | Compliance Builds | 3 days | Fri 12/20/13 | Mon 12/30/13 | |
| 13 | Network Setup And Software Loads | 5 days | Fri 12/20/13 | Fri 1/3/14 | 2 |
| 14 | TDP Review | 100 days | Fri 12/20/13 | Mon 5/19/14 | 2 |
| 15 | Physical Configuration Audit | 7 days | Mon 1/6/14 | Tue 1/14/14 | 11 |
| 16 | Electrical Supply Testing | 3 days | Wed 1/15/14 | Fri 1/17/14 | 15,12 |
| 17 | Maintainability | 3 days | Mon 1/20/14 | Wed 1/22/14 | 15 |
| 18 | Acoustical Testing | 2 days | Thu 2/13/14 | Fri 2/14/14 | |
| 19 | Usability and Accessibility | 5 days | Tue 2/18/14 | Mon 2/24/14 | 18 |
| 20 | Functional Testing | 40 days | Wed 1/15/14 | Wed 3/12/14 | 15 |
| 21 | Security | 5 days | Tue 2/25/14 | Mon 3/3/14 | 19 |
| 22 | Source Code Review | 8 days | Wed 1/29/14 | Fri 2/7/14 | |
| 23 | Compliance Builds | 5 days | Mon 2/10/14 | Fri 2/14/14 | 22 |
| 24 | Compliance Builds | 3 days | Thu 3/13/14 | Mon 3/17/14 | 20 |
| 25 | Accuracy | 3 days | Tue 3/18/14 | Fri 3/21/14 | 24 |
| 26 | Volume and Stress | 5 days | Mon 3/24/14 | Mon 3/31/14 | 25 |
| 27 | System Integration | 9 days | Tue 4/1/14 | Fri 4/11/14 | 26 |
| 28 | Trusted Builds | 4 days | Mon 4/14/14 | Thu 4/17/14 | 27 |
| 29 | Regression Testing | 5 days | Fri 4/18/14 | Thu 4/24/14 | 28 |
| 30 | Build and Tool Validation | 5 days | Fri 4/18/14 | Thu 4/24/14 | 28 |
| 31 | **Test Report** | 42 days | **Fri 4/11/14** | **Mon 6/9/14** | |
| 32 | Test Report Development | 11 days | Fri 4/11/14 | Fri 4/25/14 | |
| 33 | Test Report to ES&S for Review | 2 days | Fri 4/25/14 | Mon 4/28/14 | |
| 34 | Test Report Update | 2 days | Mon 4/28/14 | Tue 4/29/14 | |
| 35 | EAC Review | 30 days | Tue 4/29/14 | Mon 6/9/14 | |

# APPENDIX B

## TESTING TO REFLECT ADDITIONAL CAPABILITIES

## 1.0 Introduction

The Voluntary Voting System Guidelines (VVSG) allows for vendors to provide additional system capabilities in order to respond to the requirements of individual states. The scope of testing for these additional capabilities is defined by the vendor rather than the Election Assistance Commission's 2005 Voluntary Voting System Guidelines.

## 2.0 Scope of Testing

The EVS 5.2.0.0 Voting System includes additional capabilities that are excluded from EAC certification:

- ExpressPass Application – A standalone application that interfaces with Voter Registration (electronic Pollbook) systems and the ExpressPass printer to print the ballot activation code on an ExpressVote activation card. This code on the activation card activates the correct ballot the voter is authorized to vote.
- ExpressPass Printer A small, thermal, on demand printer used to print the ballot activation code on the ExpressVote activation card.

Table B1-1 lists the equipment used for the additional testing.

Table B1-1

| Equipment | Model Number | Manufacturer | Description | Serial Number |
|---|---|---|---|---|
| ExpressPass | 4200 | Microcom | Thermal bar code printer | 01901042505 |

1. **Source code review**
   a. Selection of programming languages
   b. Software integrity
   c. Software modularity and programming
   d. Control constructs
   e. Naming conventions
   f. Coding conventions
   g. Comment conventions
2. **Technical Data Package review**
   a. Equipment Functionality Description
3. **Functionality Testing**
   a. Installation and Uninstallation
   b. Proper activation of ballots using ExpressPass printed bar codes on ExpressVote cards.

4. **Trusted Build**

A Trusted Build of the software will be created using ES&S' trusted build documents. The "Trusted Build" is performed by completing the following tasks in the order listed:

a. Clear hard drive of existing data
b. Retrieve the compliant source code
c. Retrieve the installation media for OS, compilers, and build software
d. Construct the build environment
e. Create digital signatures of the pre-source build environment
f. Create a disk image of the pre-source build environment
g. Load the compliant source code into the build environment
h. Create a digital signature of the post-source build environment
i. Create a disk image of the post-source build environment
j. Build the executable code
k. Create the installation media
l. Create a digital signature of the final build environment
m. Create a disk image of the final build environment
n. Create a digital signature of the installation media
o. Install executable code onto the hardware and validate the software/firmware
p. Deliver source code with digital signature, disk image of pre-build environment with digital signatures, disk image of post-build environment with digital signatures, executable code with digital signatures, and installation media to the EAC Repository.

The "Trusted Builds" for the EVS 5.2.0.0 Voting System include source code, data, and script files, in clear text form. The builds also include COTS software on commercially available media, COTS software downloaded by the VSTL, COTS software verified by SHA256 from the software supplier, and picture and sound files in binary format provided by ES&S. The first step of the process was to clean the hard drives by writing data to every sector of the hard drive, so the drive is cleared of existing data. The designated operating system was then loaded and the applications from the VSTL-reviewed source along with the VSTL verified COTS software was built. The final step was installing the applications on the hardware.

## 3.0 Deliverables

The VSTL will provide a summary report for state certification authorities detailing the functionality tested, along with the functions not tested. Additionally, any functional issues identified during testing will be logged and identified in the letter. However, ES&S will be responsible for determining if the issues are resolved prior to releasing the equipment/application or they may choose to correct these issues and have the additional capabilities re-tested.

# APPENDIX C

## CHANGE NOTES

| Item Number | Module Affected | Version Number | Modification |
|---|---|---|---|
| 1 | ExpressVote | Hardware v1.0 | Addition of a new universal vote capture device |
| 2 | DS200 | Hardware v1.3 | Implement new motherboard and new scanner board as previous boards are going end-of-life (EOL). |
| 3 | DS200 | Hardware v1.3 | Transport component update to enhance ballot handling and manufacturing tolerances. |
| 4 | DS200 | Hardware v1.3 | Replace CFL backlight with LED backlight due to EOL (end of life). |
| 5 | DS200 | Hardware v1.3 | Usability and compatibility enhancements to battery compartment access, ballot box replacement rails, power/close compartment switch, and equipment labeling. |
| 6 | ExpressVote & ElectionWare | ExpressVote FW 1.4.0.0; ElectionWare 4.6.0.0 | Enhancement to support the Open Primary election type. |
| 7 | ExpressVote | ExpressVote FW 1.4.0.0 | Enhancement to update the field length displayed on the ExpressVote. |
| 8 | ExpressVote & ElectionWare | ExpressVote FW 1.4.0.0; ElectionWare 4.6.0.0 | This enhancement will allow the ExpressVote to display the customized precinct name that is configured in ElectionWare. |
| 9 | DS200 & ElectionWare | DS200 FW 2.12.0.0 ElectionWare 4.6.0.0 | The ability for the DS200 to query blank ExpresssVote activation cards. |
| 10 | ElectionWare | ElectionWare 4.6.0.0 | Enhances the cast vote record (CVR) export so that contest totals by district can be derived from the CVR spreadsheet. |
| 11 | DS200 | Firmware 2.12.0.0 | The enhancement allows an override to bypass "diverter not installed" stop and keep scanning. |
| 12 | DS850 | Firmware 2.10.0.0 | Added the ability to password protect the generation of results reports. |
| 13 | DS200 | Firmware 2.12.0.0 | Enhancement so the candidate order on the zero and results reports on the DS200 matches the ballot for that precinct. |
| 14 | DS200, DS850, ExpressVote, AutoMARK, & ElectionWare | DS200 FW 2.12.0.0; DS850 FW 2.10.0.0; ExpressVote FW 1.4.0.0; AutoMARK FW 1.8.6.0; ElectionWare 4.6.0.0 | Implement method to validate hash values with Trusted Build to conform to RFI 2012-04. |
| 15 | System Wide | EVS 5.2.0.0 | TDP update for Configuration Management to conform to RFI 2012-03. |
| 16 | ERM | ERM 8.11.0.0 | Audit Log timestamp updates to conform with RFI 2013-03. |
| 17 | System Wide | EVS 5.2.0.0 | Quality Improvements: enhancements to any GUI related issues and toolbox improvements |
| 18 | ExpressVote & AutoMARK | ExpressVote FW 1.4.0.0 AutoMARK FW 1.8.6.0 | Pennsylvania rule for contest re-voting conditions associated with Straight Party ticket voting. |
| 19 | ExpressVote & AutoMARK | ExpressVote FW 1.4.0.0 AutoMARK FW 1.8.6.0 | Enhancements of the ExpressVote and AutoMARK screens for plain language and conformance to usability guidelines. |
| 20 | ERM | ERM 8.11.0.0 | The ERM csv export excludes some vote totals when PRC contest types are used. |
| 21 | DS200, DS850, AutoMARK, ERM, & ElectionWare | DS200 FW 2.12.0.0; DS850 FW 2.10.0.0; AutoMARK FW 1.8.6.0; ERM 8.11.0.0 ElectionWare 4.6.0.0 | Illinois tabulation rule: An overvoted contest must count as 1 in the overvote tally, rather than being counted as the same number as the Vote-for in the contest. |
| 22 | System Wide | EVS 5.2.0.0 | Upgrade to Adobe Standard version XI. |
| 23 | System Wide | EVS 5.2.0.0 | Routine task updates for every release. For example: TDP updates, hardening scripts, source code file listings, and change notes. |
| 24 | DS850 | DS850 FW 2.10.00 | DataWin updates to DS850 firmware |
| 25 | DS200 | Hardware 1.2.3 | Incorporates all changes in ECO 1281 |

# APPENDIX D

## COTS Software Table

**The EVS 5.0.1.0 System includes the following COTS software which has been delivered by ES&S:**
* NOTE: All hashes for COTS software were obtained from the COTS provider and then verified by NTS. All propriety software developed by the manufacture is built by NTS and the hashes are provided by NTS.

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| Microsoft Windows 7, SP1 | 5.1 | Original Disc | N/A |
| Micro Focus RM/COBOL Runtime | 12.06 | Original Disc | N/A |
| Microsoft Server 2008 | R2 | Original Disc | N/A |
| Adobe Acrobat Standard | XI | Original Disc | N/A |
| Symantec Endpoint Protection Small Business Edition 2013 | 12.1.4 | Original Disc | N/A |
| Cerberus | 6.0.7.1 | | |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **ElectionWare** | | | |
| Microsoft Windows 7 Pro, SP1 | 5.1 | Original Disk | NA |
| PostgreSQL | 9.1 | postgresql-9.1.2-1-windows.exe | b15aff7d85d26227d004e65ce35794272fb630b5 |
| Oracle Java JDK | 6u29 | jdk-6u29-windows-i586.exe | 41a8656f5bf2eb15f22fdcc01350e8da37fac7df |
| **ElectionWarePaperBallot.exe** | | | |
| Microsoft Windows 7 Pro, SP1 | 5.1 | Original Disk | NA |
| Visual C++ 10.0 CRT (x86) | 10.0.40219.1 | msvcp100.dll | 2ada702a0c143a7ae39b7de16a7b5cc994d2548b |
| | 10.0.40219.1 | msvcr100.dll | 0b51fbf15cc898f8f339f8989d323bca722bfd70 |
| Visual C++ 10.0 MFC (x86) | 10.0.40219.1 | mfc100u.dll | 2771393d56ff167275bf03170377e43e28ee14a1 |
| PostgreSQL | 9.1.2 | postgresql-9.1.2-1-windows-binaries.zip | 73edb0239de58a64f30510d568c3a85a19816b75 |
| | 1.0.0.4 | libeay32.dll | 26741c73bf6fc843cb74f15070084aeab9033b4f |
| | 1.12.0.0 | libiconv-2.dll | 2c116fef19547ac5ea4d032f4a5bdad997766134 |
| | 0.17.0.0 | libintl-8.dll | ad19cce12f2175c1fd1160f8ebb464f2f3de5fca |
| | 9.1.2.11335 | libpq.dll | 85e03b03e00bc8ef7cf2fd77e50fa4641e820eb3 |
| | 1.0.0.4 | ssleay32.dll | f6eee4c41027ded239023a7fe8ad9c0f81adf947 |
| XercesC++ XML Parser Library | 3.1.1 | xerces-c_3_1.dll | Must be built from source. Hash will come from trusted build. |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **Election Reporting Manager** | | | |
| Microsoft Windows 7 Pro, SP1 | 5.1 | Original Disk | NA |
| Micro Focus RM/COBOL Runtime | 12.06 | | NA |
| InfoZip | 2.32 | unzip.exe | e1652b0558195db3f5f754b7ab130652ac04a50b8 |
| | 5.5.2 | zip.exe | 55e5a72010291fea2275ceffb5b197dd0bac11a60 |
| RoboHelp 2000 | 8.0.131.0 | ROBOEX32.DLL | 964d83c7f4dcdc1024140Sdc04e7d44db599cf3d |
| RoboHelp X5 | 13.10.606.0 | wh2robo.dll | 4ff22ef837373459232906078dc1d4d1464598db |
| Shamir Optical | 1.0.0.0 | OpenSaveFile.ocx | 47f736752a9894553ec11134bffcd5a4455e29ef |
| RSA Encryption Library | 3.0.0.1 | ccme_base.dll | 652f5069fea72f20faea001e887073b69c8281b0 |
| | 3.0.0.1 | ccme_ecc.dll | 1a2f71f2ae1b215739718f04b23a6cdf0eaaf432 |
| | 3.0.0.1 | ccme_eccaccel.dll | 0f90ec44c40227d9b59c9dbc7e1e3b51618513d0 |
| | 3.0.0.1 | ccme_eccnistaccel.dll | 6698462aa02d592cf9a5a9c9dad512f047d289d9 |
| | 3.0.0.1 | cryptoccme2.dll | cc10515599cb629a1137cedbf68ba0c9ce445fe3 |
| | 3.0.0.1 | cryptoccme2.sig | 61174bc0385d8a0e5a697f8c4148ff8114ba13a1 |
| Dynamic linked library for Xerces-C | 2.8.0.0 | xerces-c_2_8_vc80.dll | 2896bc1d9f6bc38a2c34d76fdc6749f09f0395462 |
| Visual C++ 10.0 CRT (x86) | 10.0.40219.1 | msvcp100.dll | 2ada702a0c143a7ae39b7dc16a4b5cc994df2548b |
| | 10.0.40219.1 | msvcr100.dll | 0b51fb415ec89848f339f8989d323bea722bfd70 |
| Visual C++ 10.0 MFC (x86) | 10.0.40219.1 | mfc100.dll | 29dd7ca9af40S5c6897788c1afaadf59dd5d8b0e |
| | 10.0.40219.1 | mfc100u.dll | 2771393d56ff167275bf03170377c43c28ee14e1 |
| | 10.0.40219.1 | mfcm100.dll | 432a2fddbb87bd13e4e40428e4c6a167eebd7bf1 |
| | 10.0.40219.1 | mfcm100u.dll | e7fb9b6a36e2f9ad381d00d14e1a20b541c70d94 |
| **EventLog Service** | | | |
| Microsoft Windows 7 Pro, SP1 | 5.1 | Original Disk | NA |
| Visual C++ 10.0 CRT (x86) | 10.0.40219.1 | msvcp100.dll | 2ada702a0c143a7ae39b7dc16a4b5cc994df2548b |
| | 10.0.40219.1 | msvcr100.dll | 0b51fb415ec89848f339f8989d323bea722bfd70 |
| **Removable Media Service** | | | |
| Microsoft Windows 7 Pro, SP1 | 5.1 | Original Disk | NA |
| Visual C++ 10.0 CRT (x86) | 10.0.40219.1 | msvcp100.dll | 2ada702a0c143a7ae39b7dc16a4b5cc994df2548b |
| | 10.0.40219.1 | msvcr100.dll | 0b51fb415ec89848f339f8989d323bea722bfd70 |
| **AutoMARK** | | | |
| Eurotech WinCE OS | 5.00.20 | nk.nb0 | 941cc95e9884e6073d5daa33f80b37bfc528d246ac7a9cb02c26e21bc05ddf57 |
| | | ADSApiDll.dll | 7841640c8514ab4c8c8e457b4e1374cbb61c9a85ab3b0b3e0a64995e23693708 |
| | | FSHDRV.dll | f5e67f3c907fbc860b2662da3bb1038ec669cba003a8e9a0a9ddd441f5bd915d |
| | | sysUpgrad.exe | 567da9e0f20dd3a13af9922d07adfa4995ce390fca190b549bf005f30fed5bd9 |
| Ricoh SBC/Bootloader | 5K509399AT.A 2.0/1/3/0 | bootloader.bin | 7ee9258eb57c37c2d5cbf7429a2e1774092b570e1bf98a0f83ad511b182cc02e |
| | 5K509399010.A 2.5/1/3/1 | bootloader.bin | 9042589bad245a864e0cbe3d65ba5c552135e4a8cdb67c9116f0aed92372651d |
| **DS200** | | | |
| N/A | N/A | N/A | N/A |
| **DS850** | | | |
| N/A | N/A | N/A | N/A |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **EMS Build Environment** | | | |
| Apache Software Foundation<br>Ant | 1.7.1 | apache-ant-1.7.1-bin.zip | a7e8fa7bc2102a8d8df99c64db73c2eae3d8b483 |
| Apache Software Foundation<br>Xerces-C++ | 3.1.1 | xerces-c-3.1.1.zip | b61e2829f68d812d649bddaf5264a98f9837201a |
| CodeSynthesis<br>XSD<br>Including<br>Apache Software Foundation<br>Xerces C++ 2.8.0 | 3.1.0 | xsd-3.1.msi | aa5f2fb2c815e8e1aa94314e0869751d056690b |
| Flexera Software (Macrovision)<br>InstallShield | 2008<br>Premier Edition | Original CD<br>(two disk set) | N/A |
| Flexera Software (Macrovision)<br>InstallShield Standalone Build Script Objects | 2008<br>Premier Edition | installshieldinstallscriptobjects.exe | 6cb960636e4474277fe12a51ee0d0704ee9246ed |
| MicroFocus (Liant)<br>RM/COBOL Development System | 12.06 | rmcobol1206ds.exe | f0e1a2ed06936eb12f860deb1a4d8ee63508821 |
| | 12.06 | wowext1206.exe | 0d9bd6aa0c96dd4552656d54b677750655844761 |
| Microsoft<br>Visual Studio | 2010 Premium<br>(X86) | en_visual_studio_2010_premium_x86_dvd_509357.iso | a4c699666196ad0f704fe9d97fac2a723ef75a99b |
| | 2010<br>Service Pack 1<br>(x86) | mu_visual_studio_2010_sp1_x86_dvd_651704.iso | 61c2088850185ede8e18001d1ef3e6d12daa5692 |
| Microsoft<br>Windows | XP Professional<br>with Service Pack 3 | Original CD | N/A |
| | XP Professional<br>Update (KB971513) | WindowsXP-KB971513-x86-ENU.exe | e18df80512a6d9eaa206825b981e33c0973abcc |
| Microsoft<br>Windows Driver Kit (WDK) | 7.1.0.7600 | GRMWDK_EN_7600_1.ISO | de6abdb8eb1e08942add1aa270c763ed1e3d8242 |
| Oracle (NetBeans)<br>NetBeans | 6.9.1 | netbeans-6.9.1-ml-javase-windows.exe | 84d4a09937c8dcb3c199cf6281672aefe137f70e |
| Oracle (SDN)<br>Java SE Development Kit | Version 6 Update<br>29 | jdk-6u29-windows-i586.exe | 41a8656f5bf2eb15f22fdcc01350e8da37fac7df |
| PostgreSQL Global Development Group<br>PostgreSQL | 9.1.3-1 | postgresql-9.1.2-1-windows.exe | b15df7d85d26227d004e65cc35794272fb630b5 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **EMS Build Environment** | | | |
| RSA<br>BSAFE Crypto-C | Micro Edition (ME) 3 | r_unpack.exe | 5c48f05c4cf65784f5b129e15a0538361193ff015 |
| | Micro Edition (ME) 3 | cryptocme-3_0_0_1-win32vc8.pkg | 30fb23005a0ec315a5eeeee37efbf64b3e3f62b20 |
| SourceForge<br>Boost C++ Libraries | 1.46.1 | boost_1_46_1.zip | 62ae61cb2756abfc8515f842023ca572e733b2f2 |
| | 1.46.1 | libboost_date_time-vc100-mt-1_46_1.zip | edf7a788cc8c0e505fdb5fcf5bfb9da430a7dfee |
| | 1.46.1 | libboost_filesystem-vc100-mt-1_46_1.zip | e31498f188d644a6aedacb23c925cb956ed03f5c |
| | 1.46.1 | libboost_file-system-vc100-mt-s-1_46_1.zip | dc2142b4ae049e2e1e577ddc9bbfa12e468522S6 |
| | 1.46.1 | libboost_program_options-vc100-mt-1_46_1.zip | 07abf1aaa7548d1273b91afcda83d35bd35f1bcc |
| | 1.46.1 | libboost_system-vc100-mt-1_46_1.zip | 3fa909d6e6fdccf0c9c5a5a668c85789cc202cfa |
| | 1.46.1 | libboost_system-vc100-mt-s-1_46_1.zip | 3970de2312ab82b7ea4fe29ad31aa622571b39d9 |
| InfoZip | 2.32 | unzip.exe | a1652b058195db3f5f754b7ab130652ac04a50b8 |
| | 5.52 | zip.exe | 55c5a72010291fea2275ccfb5b197dd0bac11a60 |
| MarshallSoft | 0.0.0.0 Linker Rev. 3 | WSC32.DLL | ac0d9b7d7ac30e98af162735bc9e7b1b24c48d23 |
| RoboHelp 2000 | 8.0.131.0 | ROBOEX32.DLL | 964d83c7f4dedc10241408de04e7d44eb599ef3d |
| RoboHelp X5 | 13.10.606.0 | wh2robo.dll | 4ff22cf8373734592329060878dc1d4d1464598db |
| Shenm Optical | 1.0.0.0 | OpenSaveFile.ocx | 41f736752a9894553ee11134bffcd5a4455c29ef |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **AutoMARK Build Environment** | | | |
| AutoIt Consulting<br>AutoIt | 3.2.10.0 | autoit-v3-setup.exe | bb913c21b1eeb8a580ea226d0a521f339d752596 |
| Applied Data Systems<br>Xscale | 1.2 | ADS_XSCALE_1_2_SDK.msi | 991746a6251e28fc8b28b139c00565f23603f35c |
| Cosmic Software<br>68HC08 C Compiler | 4.1h | Original CD | N/A |
| Keil<br>µVision2<br>Note: CD is mislabeled µVision3 | Release 04.2004 | Original CD | N/A |
| Keil<br>µVision2 | Add-On Disk | Original 3.5" High-Density Floppy Diskette<br>Note: Must transfer to a CD | N/A |
| MacroVision<br>InstallShield Professional | 10.5 | Original CD | N/A |
| Microsoft<br>Visual Studio | .Net 2003 | Original CD | N/A |
| Microsoft<br>Windows | XP Professional with Service Pack 3 | Original CD | N/A |
| Microsoft<br>Windows CE Platform Builder | 5.0 | Original CD | N/A |
| | Cumulative 2004 Update | WinCEPB50-041231-Prodnet-Update-Rollup-Armv4I.msi | 2a33a1540e25118e9360e729Saf7c96da206006f |
| | Cumulative 2005 Update | WinCEPB50-051231-Prodnet-Update-Rollup-Armv4I.msi | 3310874e41fd2a8e79ddc97ac9a47b91d203bdf9 |
| | January 2006 Update | WinCEPB50-060131-2006M01-Armv4I.msi | 8842410a89bd1fda9683fb6d6ba141fe82ef9b2c |
| | February 2006 Update | WinCEPB50-060228-2006M02-Armv4I.msi | 4695c80aff3707a1926ec54d0756af3a426d8e0f |
| | March 2006 Update | WinCEPB50-060331-2006M03-Armv4I.msi | 39dc323b9736441893322fc1b159bc94dd2ec3b5 |
| | April 2006 Update | WinCEPB50-060430-2006M04-Armv4I.msi | 823e496b554f9d3d29cd491f80ffda9729176b89 |
| | May 2006 Update | WinCEPB50-060531-2006M05-Armv4I.msi | 29df27801e8bd2a3a68567cfa65e1ff54de8ae65 |
| | June 2006 Update | WinCEPB50-060630-2006M06-Armv4I.msi | 7421d73ec31ed1e9250c6e591c14f00a98988f59 |
| | July 2006 Update | WinCEPB50-060731-2006M07-Armv4I.msi | 0bab5055a648ea23a64c3e89cf01e88cc9836b5c |
| | August 2006Update | WinCEPB50-060831-2006M08-Armv4I.msi | 43b5d5a6f1bc643c9dd4af970dc1785188bbc622 |
| Microsoft<br>Embedded Visual C++ | 4.0 | Original CD | N/A |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **AutoMARK Build Environment** | | | |
| RSA<br>BSAFE Crypto-C | Micro Edition (ME) 3 | r_unpack.exe | 5c48f05e4cf65784f5b129e15a0538361193f015 |
| | Micro Edition (ME) 3 | cryptocme3_3_0_0_0-ppc2003.pkg | 5ac651f5927f6cd8c16dea81c99df5504f1df9e6 |
| Texas Instruments<br>Code Composer Studio | v2<br>TMS320C5000<br>DSP Platform | Original CD | N/A |
| **VAT_1.7.0.0t_Buildpkg_COTS.zip** | N/A | N/A | N/A |
| Microsoft<br>Visual Studio .NET 2003 | N/A | cabwiz.dll | dd44f51cdd27710a1ee65227615431672c4bd05 |
| | 1.00.0601 | Makecab.exe | 4823951d19e34deb658228822df95f7df5e1344e |
| Microsoft<br>.NET Compact Framework | 1.0.2268 | Microsoft.WindowsCE.Forms.dll | 939eb54fedb95782a73837e81ac201f2d638e9da |
| | | MSCORLIB.DLL | 8e57ebd267aea2085de258f3fceec0590de52f35 |
| | | System.Data.Common.dll | ar7bea9e02c545cc32d43b017fc68f3fbbe0fa90 |
| SpeechWorks International, Inc.<br>ETI-Eloquence TTS Engine | 6.1.0.0 | chs.syn | 8a141d890a4ed7aeddf24f7aa2e3b798338dd9da4 |
| | | chsrom.dll | 5e134dcb10442e9394d96d3f3135909637e60383 |
| | | eci.dll | de792ecd3d1ac96f8f1d507e22ab800376a0d71e |
| | | enu.syn | 08dbccbc6ef27a253535fe1a0d7d8a27169049c5 |
| | | esm.syn | caf755997ea901f37d17e4e152b1b10ad349e2a8 |
| | | jpn.syn | 32ca16e5034918711e8d056b850cd5279871762a |
| | | jpnrom.dll | 0a6c13ad82b0f5c5106f10f9d010a8b7e7e7cda1 |
| | | kor.syn | 859238bffaa11c2e719278240c8ca0afc96db2d |
| | | korrom.dll | 1de6f1af4250fcefe542a48acef7ad990f2d04beb |
| ATEN Technology Inc. | N/A | PL2303.CAT | a1bd69bdef67a0e90cdc1785015b62116c55976d |
| | N/A | SER2PL.INF | b682d49b5083fb58a4c7725884dff0b173d0afc6 |
| | N/A | SER2PL.SYS | 60ea554d7e0695998fa83668fe6ae3d21e30cc47 |
| **VAT_1.7.0.0t_Source_COTS.zip** | N/A | N/A | N/A |
| Entuence, Inc | 1.3 | enresult.h | 026f14e00f2ffac65ff78ff219523ec702a8971c |
| | 1.7 | entypes.h | 62f2e746d9e10e33167a8252523e72dc38489e0f |
| | 1.7 | tsmiface.h | 45e4323d1c24134fea1d653072a116b330474742 |
| | 1.21 | TSMStrmObj.h | d6bd6b1a0c6815e6935c3f7b5439baa5f879491e |
| | N/A | tstarmv4I.lib | 57f15b940f5cd0bf404f3cd10b003db40bfb4e7c |
| FTDI Ltd | 1.0.1.3 | FTD2XX.h | 2d753f2d72fa3adab894b0dbf8c85a97466ec89c |
| | | FTD2XX.lib | 4685d678b54a7a0159b97b510fc2741cfa64fb5f |
| zlib | 1.1.4 | unzip.cpp | afbb534d029875028b7d404Se895083d6901ab32 |
| | | unzip.h | 5d6a56bd1dbab11ac05e801b8b511d4736e88ed |
| **VAT Preview_1.7.0.0t_Installpkg_COTS.zip** | N/A | N/A | N/A |
| SpeechWorks International, Inc.<br>ETI-Eloquence TTS Engine | 6.1.0.0 | chs.syn | ff7c1873b84256e25da601d70ad280333e5ce167 |
| | | chsrom.dll | f3ae8a1f7d0369d387b8f2ee0a47a76efee2bc2f |
| | | eci.dll | 7add0851742b2bcc6016c8074297bc6d140b823df |
| | | enu.syn | 3c69875d11e0a53c39e211e481cb6520f8d87f25 |
| | | esm.syn | d8057d86c5f677e89eca7834ac17fbd030a043aa |
| | | jpn.syn | 99a951c76e6008da9011b91b4d91e116cec8f7d7 |
| | | jpnrom.dll | 7557e00e8acc29affdabcbddb73f166d0877a866 |
| | | kor.syn | f32f8ac286cd278320dbb829df338b97a2c816b5 |
| | | korrom.dll | 76219d7f9f76f021b41815fa796f80e3ca49e3446 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200 Ancillary Devices Build Environment** | | | |
| Keil µVision3 | 3.51 | Original CD | N/A |
| Cypress EZ-USB Dev Kit | 2.31 | Original CD | N/A |
| IAR MSP430 Embedded Workbench | 3.40A | Original CD | N/A |
| Microsoft Windows | XP Professional with Service Pack 3 | Original CD | N/A |
| **DS200** | | | |
| Linux From Scratch | 6.2-5 | lfslivecd-x86-6.2-5.iso | b3e3947bf2c3616fa45541c0643a2adfa0618207 |
| **/lfs-sources (LFS Base Files from Live CD)** | | | |
| autoconf | 2.59 | autoconf-2.59.tar.bz2 | d366a07b2d99c95b7f24395ad8a8e023d8d493b69 |
| automake | 1.9.6 | automake-1.9.6.tar.bz2 | d205d8b274d3f5bc1cf6734f27fb452c7131866 |
| bash | 3.1 | bash-3.1.tar.gz | 766e3fd9381616d8a103f812f662fd8ac791cf29 |
| bash fixes | 3.1 | bash-3.1-fixes-8.patch | 03d6781dd9ad6336eda906d5645e166e1641dd49 |
| bash doc | 3.1 | bash-doc-3.1.tar.gz | 9eacbbdf3b1bc03819b1ea82cdbcc0f5c61570e1 |
| binutils | 2.16.1 | binutils-2.16.1.tar.bz2 | 5e80fd5657da47efc16a63fdd93ef7395319fbbf |
| bison | 2.2 | bison-2.2.tar.bz2 | b01691e83cc0d08d3c03e32e194f6b03381ecd21 |
| bzip2 | 1.0.3 | bzip2-1.0.3.tar.gz | 7e7749510f65e86fbfff37b97144a02f1b8b8617f |
| bzip2 patch | 1.0.3 | bzip2-1.0.3-bzgrep_security-1.patch | 56a29bf1278f21bc30e72d19e5766bfda5e74e5b |
| bzip2 docs patch | 1.0.3 | bzip2-1.0.3-install_docs-1.patch | ead85296356efc99dba45529ef7acb9f61dd33daa |
| coreutils | 5.96 | coreutils-5.96.tar.bz2 | 782379daf200427058ca94a108566d600f779823 |
| coreutils patch | 5.96 | coreutils-5.96-i18n-1.patch | 3ff73eccac8ef66345efcd38f770e51db1d02199 |
| coreutils patch | 5.96 | coreutils-5.96-suppress_uptime_kill_su-1.patch | a7dedf947b7651f882c8ede00eb6e56689bbb154 |
| coreutils patch | 5.96 | coreutils-5.96-uname-1.patch | 42cc795e56b96994a4dc9e8f2a8dd72b6a25665f |
| db | 4.4.20 | db-4.4.20.tar.gz | bb4e68a4afc14712eb2954b79910dc9fc93bf7b |
| db patch | 4.4.20 | db-4.4.20-fixes-1.patch | 46886ccdf1ea6daab392e5c46b4923f7e71e7d55 |
| dejagnu | 1.4.4 | dejagnu-1.4.4.tar.gz | fd82ffd396eba5b595f76af2f4a068cb7fcc6effb |
| diffutils | 2.8.1 | diffutils-2.8.1.tar.gz | a4c467c3a6a08cde9f3d94d02067cc26436c7dc5 |
| diffutils patch | 2.8.1 | diffutils-2.8.1-i18n-1.patch | 2d88d693ab572f0f990a3a28dcb5c743e288b9da |
| expect | 5.43.0 | expect-5.43.0.tar.gz | 854440d937c1d05103bf2d02f911005b739fa1e9 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200** | | | |
| expect patch | 5.43.0 | expect-5.43.0-spawn-1.patch | ba903a7d04fb4faa13e8b9db75c1537f55f28e82b |
| file | 4.17 | file-4.17.tar.gz | e03710a3feb95db6d0ee9efedf88e19a5c525ee1 |
| findutils | 4.2.27 | findutils-4.2.27.tar.gz | 0655e10b20dc66b1ccddfa45e5d6c57a3cd312a2 |
| flex | 2.5.33 | flex-2.5.33.tar.bz2 | aedb8ff6455967ad1a5bfc71855dbcc1253ee56 |
| gawk | 3.1.5 | gawk-3.1.5.tar.bz2 | 0d5694461f1c32f1cae41a1e0d7ba0939b47e369 |
| gawk patch | 3.1.5 | gawk-3.1.5-segfault_fix-1.patch | 8dde8415d03b1897f50d5b12b6c876feda15e0be |
| gcc | 4.0.3 | gcc-4.0.3.tar.bz2 | 5a94943d9ab823ef8d080cc7f9e8a4a91797afea |
| gcc patch | 4.0.3 | gcc-4.0.3-specs-1.patch | 04d4b7d68bfd6b362e9b75678584641a2dde7c2f |
| gettext | 0.14.5 | gettext-0.14.5.tar.gz | 68737eee1a6127044eef901dc88e1f44d371fb6b |
| glibc | 2.3.6 | glibc-2.3.6.tar.bz2 | 82d0487419f1bdbf2dee439c344e89d6af47e558 |
| glibc patch | 2.3.6 | glibc-2.3.6-inotify-1.patch | d282d10108a4f6b9c6eddc4351a83abe22a5b5b6 |
| glibc patch | 4.0.3 | glibc-2.3.6-linux_types-1.patch | 0bdf2b15e20c176caf3c85e5b6a7bc957f636d6a |
| glibc-libidn | 2.3.6 | glibc-libidn-2.3.6.tar.bz2 | 95d3a98495d4bd7138149fd312db88da56e735db |
| grep | 2.5.1a | grep-2.5.1a.tar.bz2 | 2cd082775d30be463c0ac674a00595eb50fda22e |
| grep patch | 2.5.1a | grep-2.5.1a-redhat_fixes-2.patch | 6f7f1623d1909f07dc08a8a16a24cbce6be8dfc5 |
| groff | 1.18.1.1 | groff-1.18.1.1.tar.gz | 19c8c83e6ee29dd6041dae0daf1c1d0debd3d32a |
| groff patch | 1.18.1.1 | groff-1.18.1.1-debian_fixes-1.patch | 39fb82b9673523cb2451a04919269326ea97dd |
| grub | 0.97 | grub-0.97.tar.gz | 2580626a4579bd39336d3af4482c346c95dae4fb |
| grub patch | 0.97 | grub-0.97-disk_geometry-1.patch | 651801fe6d851e9f59ecd16b6bd49f1358c9594c |
| gzip | 1.3.5 | gzip-1.3.5.tar.gz | 843272609b9bff1bdf2770a28d498d6519901e73 |
| gzip patch | 1.3.5 | gzip-1.3.5-security_fixes-1.patch | 3ab15ed9f2b8b3e26b6f8d878f5cf48f822abaa |
| iana-etc | 2.10 | iana-etc-2.10.tar.bz2 | 6a2960c42ccf3266680b7adb83f239e5a640220e |
| inetutils | 1.4.2 | inetutils-1.4.2.tar.gz | 6b60d2e78702512e95afac36415f6fe3523dba77 |
| inetutils patch | 1.4.2 | inetutils-1.4.2-gcc4_fixes-3.patch | 77b063b0fcc15a55e28c18e1b30e1edf5b1b7d3a |
| inetutils patch | 1.4.2 | inetutils-1.4.2-no_server_man_pages-1.patch | ccd3c59f9ed4eca6f7a8dffb494ed8916087bc50 |
| iproute | 2.6.16-060323 | iproute2-2.6.16-060323.tar.gz | 76d866bb3b46a7b2e73d79a4fbf6fa8971527633 |
| kbd | 1.12 | kbd-1.12.tar.bz2 | 65caac4d98fca3f7ac7dfe9d9db7c5a432c6475f |
| kbd patch | 1.12 | kbd-1.12-backspace-1.patch | 39e332e42d5145dfc47786dba5eff63cda91d0ba |
| kbd patch | 1.12 | kbd-1.12-gcc4_fixes-1.patch | 93ec9885a79f779088f1533ec52f1a87dae69500 |
| less | 394 | less-394.tar.gz | fb0d9aa30ee461866786c4080bb594fc3337bb02 |
| lfs-bootscripts | 6.2 | lfs-bootscripts-6.2.tar.bz2 | 616cccc3d67a79169e625417411f981ca5150e348e |
| libtool | 1.5.22 | libtool-1.5.22.tar.gz | 17353e66acaac80ac188ea0a3a90609550ee3254 |
| linux patch | 2.6.16.27 | linux-2.6.16.27-utf8_input-1.patch | 1245a73e16a0d6d1fb1adfa167bbee2c02ea92db5 |
| linux-libc-headers | 2.6.12.0 | linux-libc-headers-2.6.12.0.tar.bz2 | e72e9b260995b269c9fb9248ed468e18fb01f3fd |
| linux-libc-headers patch | 2.6.12.0 | linux-libc-headers-2.6.12.0-inotify-3.patch | 724f0340907df408d17650fd2e5848d0a9e1799 |
| m4 | 1.4.4 | m4-1.4.4.tar.gz | 4861140eb54b6e9e135d04b5fbf46fff57f969a5 |
| make | 3.80 | make-3.80.tar.bz2 | d2085842f08e57d58d3e1cd75a5f0342a60e5f45 |
| man-db | 2.4.3 | man-db-2.4.3.tar.gz | a9f6ac22cad9718605920cedb5f6611df13d4fa |
| man-pages | 2.34 | man-pages-2.34.tar.bz2 | 99278a1d006130a2409791f20c0ee1751184a41d1 |
| mktemp | 1.5 | mktemp-1.5.tar.gz | aa001fd61d13bbff28dc58ca4dc6d83311435bac |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200** | | | |
| mktemp patch | 1.5 | mktemp-1.5-add_tempfile-3.patch | e1ea0cf1d5993a44bf82c369d60f115c2cf92b95b |
| module-init-tools | 3.2.2 | module-init-tools-3.2.2.tar.bz2 | b51e8ae170bc23a1f2e301a1dddd47a47ee2186a |
| module-init-tools patch | 3.2.2 | module-init-tools-3.2.2-modprobe-1.patch | 0eaecb2078cc47e97e496e2e4717b8b82a52eb01 |
| ncurses | 5.5 | ncurses-5.5.tar.gz | 46414a72e91a62f63a8c9af0070d65497f5ecc5b |
| ncurses patch | 5.5 | ncurses-5.5-fixes-1.patch | 617e1de363a6dc2cfcaf5eaafd78cfc01ab34f48 |
| patch | 2.5.4 | patch-2.5.4.tar.gz | a12d520cba0dc35d1e1d50ca75b7684151a10de9 |
| perl | 5.8.8 | perl-5.8.8.tar.bz2 | 4aab190041072?ca4119098720eea2ba4367df539 |
| perl patch | 5.8.8 | perl-5.8.8-libs-2.patch | b72468149a5cce6facfdc7f32bb05bda6c2a1e9d |
| procps | 3.2.6 | procps-3.2.6.tar.gz | 91f44180cb50a94cb945e2598c0c849879e65893 |
| psmisc | 22.2 | psmisc-22.2.tar.gz | 1ac222803e5b5967a1b93e69f08330e0cde1a554 |
| readline | 5.1 | readline-5.1.tar.gz | 4b2ee2bc9e6dd1d238c84a58f7e6db173600b850 |
| readline patch | 5.1 | readline-5.1-fixes-3.patch | f58bbd80e7aed462ab7e97e3ac4eae7cd9d1b835 |
| sed | 4.1.5 | sed-4.1.5.tar.gz | 8e575e8a41568392d5b6c089cab5da5edbd15885 |
| shadow | 4.0.15 | shadow-4.0.15.tar.bz2 | 0f7ed3366a032091fdffd2f8edf65056bd576cae |
| sysklogd | 1.4.1 | sysklogd-1.4.1.tar.gz | 093775da0e429d0768cf195ceb20fdd6d96aeeea |
| sysklogd patch | 1.4.1 | sysklogd-1.4.1-8bit-1.patch | edc01eceb4ae7af3d0a02e23a4dace8fee50f3eb |
| sysklogd patch | 1.4.1 | sysklogd-1.4.1-fixes-1.patch | 4fbd5e56e212c8e37f363eb48ba86a5ecea21f4a |
| sysvinit | 2.86 | sysvinit-2.86.tar.gz | 3e78df609a2ff0fea6304cb662a7f10298d03667 |
| tar | 1.15.1 | tar-1.15.1.tar.bz2 | f861b7524a0867833056dc382e68085234cae6ff |
| tar patch | 1.15.1 | tar-1.15.1-gcc4_fix_tests-1.patch | ba780e0e88c7993a69d5a49891?e135bf16e7df8 |
| tar patch | 1.15.1 | tar-1.15.1-security_fixes-1.patch | 93fd5a55becf25d03bb7e18dffc0bce27e29d207 |
| tar patch | 1.15.1 | tar-1.15.1-sparse_fix-1.patch | 269dfcc556b6217d27d043ea623df75e19e3d8c9 |
| tcl | 8.4.13 | tcl8.4.13-src.tar.gz | 4af6bec9a941d7d798df4287eebece7ded67489c |
| texinfo | 4.8 | texinfo-4.8.tar.bz2 | b19e906f7220294c1e8b087d583c50f3c4d7c420 |
| texinfo patch | 4.8 | texinfo-4.8-multibyte-1.patch | b97ae3468c03f8389dbf5c9b6eed64f996f9ed5c |
| texinfo patch | 4.8 | texinfo-4.8-tempfile_fix-2.patch | 2ead28db8e2679cdb53e1e4908209f0a81397dfe |
| udev | 096 | udev-096.tar.bz2 | 8d15b89fdf93be84e2d33f6061e140aed0a4dcc |
| udev-config | 6.2 | udev-config-6.2.tar.bz2 | 5cd22b8e9cf1e996871e2bc540d75e57a4f706a3 |
| util-linux | 2.12r | util-linux-2.12r.tar.bz2 | 340b7eb5ae1d8b2200b2cd34a0a604b0db577e4 |
| util-linux patch | 2.12r | util-linux-2.12r-cramfs-1.patch | 00f5192493b939c2c996df9c1f3f769ab0a3fa8c |
| vim-7.0 | 7.0 | vim-7.0.tar.bz2 | 38cf48cabf942d0dc804a794dcc6f002b94557f8 |
| vim-7.0 patch | 7.0 | vim-7.0-fixes-7.patch | eaf8b4b5635cf72cdd033b048a993f80c5a5aa7b |
| vim-7.0-lang | 7.0 | vim-7.0-lang.tar.gz | 3db6b0004d213490cc00d361835c7a7e685a8b52 |
| vim-7.0-manpdf patch | 7.0 | vim-7.0-manpdf-1.patch | 182f16dfaccfdd3b?6f821dea71?0517cd14230 |
| vim-7.0-spellfile patch | 7.0 | vim-7.0-spellfile-1.patch | 4e0eb189a9b8f989f154d14eadb50deba619dd2b |
| zlib | 1.2.3 | zlib-1.2.3.tar.gz | 60faeaaf250642db5c0ea36cd6dcc9f99c8f3902 |
| **lfs_kernel-2.6.35.13-src.tar** | | | |
| Linux Kernel | 2.6.35.13 | linux-2.6.35.13.tar.bz2 | b828b1db449c88a00209b158efc0d192fa960c1 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200** | | | |
| **lfs_cots-3.0-rhel30-src.tar** | | | |
| cryptocme | 3.0-rhel30 | cryptocme-3.0-rhel30.tar.gz | 4fe8c6a6ddbf524cfa88e3e6cf195447afc67977 |
| **lfs_enhanced-2.7.0.0v-src.tar** | | | |
| alsa-lib | 1.0.13 | alsa-lib-1.0.13.tar.bz2 | 82fa9a7fdb13b31952db18151ca86d691a20f4a3 |
| alsa-utils | 1.0.13 | alsa-utils-1.0.13.tar.bz2 | 05b160a0e7ac6519ea372404764f026b59dbc710d |
| aumix | 2.8 | aumix-2.8.tar.bz2 | 5cea563ae91f628433a1950a36efd23681da4bf4 |
| beecrypt | 4.1.2 | beecrypt-4.1.2.tar.gz | 71cebd3329bb2561ffba24a2004dfac50b143f59 |
| blfs-bootscripts | 20060910 | blfs-bootscripts-20060910.tar.bz2 | 58ff10492f9abceed6ca4a105c479d5f2e3e8002 |
| BLFS-ca-bundle | 3.12.5 | BLFS-ca-bundle-3.12.5.tar.bz2 | 8cf4be307218f4910f8cfc3888ef0ba1cb58a5377 |
| boost | 1.43.0 | boost_1_43_0.tar.bz2 | b8257b7da2a7222739314f8d1e07e217debe71d6 |
| coreutils | 6.9 | coreutils-6.9.tar.bz2 | 10310a78c4e1d9f742f3815ac28e9bf1086a5885 |
| cpio | 2.6 | cpio-2.6.tar.gz | 5a4ea156519909994fe05933dc823abcf07e3e21 |
| cpio-security_fixes-1 | 2.6 | cpio-2.6-security_fixes-1.patch | d8445256032b903bbd3cee2694e87412e7dca843 |
| ctags | 5.6 | ctags-5.6.tar.gz | 930afaa138624717393fe475201f795251bd5e5e |
| curl | 7.15.3 | curl-7.15.3.tar.bz2 | 7e764126ce564429fe2f142428a27cbfc8fb69ee |
| cvs | 1.11.22 | cvs-1.11.22.tar.bz2 | 5dfa11da84a890d7d61516fd450c001dc24bcc0d |
| cvs-zlib-1 | 1.11.22 | cvs-1.11.22-zlib-1.patch | 0d20bab8a6b6e419a8c900d082b487ad6a3aec38 |
| docbook-xsl | 1.69.1 | docbook-xsl-1.69.1.tar.bz2 | aaabf0e274609134e187a6c36d2be23f3471f507 |
| dosfstools | 2.11 | dosfstools-2.11.src.tar.gz | b0d8714475ca7a7a96a46adf7cd839d69ce2f412 |
| e2fsprogs | 1.41.14 | e2fsprogs-1.41.14.tar.gz | 24f9364fa3d4c0d7d00cb627b819d0e51055d6c5 |
| expat | 2.0.1 | expat-2.0.1.tar.gz | 663548c37b996082db1f2f2c32af06fdf7ad15d2d |
| fuse | 2.8.5 | fuse-2.8.5.tar.gz | 862320b56d6bc4ad5e7bc2b1e0b502916a6aa09b |
| fuse | 0.2.12 | fuse-zip-0.2.12.tar.gz | fa6f1a32d7fbe0d8c8598b8c7f56129fe5abe173 |
| gnupg | 1.4.3 | gnupg-1.4.3.tar.bz2 | 9c96b36e1f1d1e8bc5028e99fae674182cbdb370 |
| gpm | 1.20.1 | gpm-1.20.1.tar.bz2 | e48d937e62abb438e2f6439b34ef3332e89af8d1 |
| gpm-segfault-1 | 1.20.1 | gpm-1.20.1-segfault-1.patch | da53bf78a0eba5020e332aa6d686159170ed86 |
| gpm-silent-1 | 1.20.1 | gpm-1.20.1-silent-1.patch | 8899a212eadfbda201d8da3e4590bd05b97f9f6 |
| libao | 0.8.6 | libao-0.8.6.tar.gz | 2050e008ffcfd6803e2c2c03c7d5f169b6d8379e |
| libogg | 1.1.3 | libogg-1.1.3.tar.gz | a3e495a8baf6939efad7e0bd11cc0e466838c3db |
| libusb | 0.1.12 | libusb-0.1.12.tar.gz | 599a5168590ff66bc6f1f9a299579fd8500614807 |
| libvorbis | 1.1.2 | libvorbis-1.1.2.tar.gz | 20289fc41aa5436b1a277d726bb5cb106d675c35 |
| libxml2 | 2.6.26 | libxml2-2.6.26.tar.gz | 094ac2aae1c295fc227d88e803013557a269358a |
| libxslt | 1.1.17 | libxslt-1.1.17.tar.gz | 5b36ab3e1ed85ed0862a10ce22ca03e1084d9121 |
| libzip | 0.9.3 | libzip-0.9.3.tar.bz2 | 16e94bc0327f1a76a0296a28908cf6439b0a0a67 |
| net-tools | 1.60 | net-tools-1.60.tar.bz2 | 944fb70641505d5d1139dba3aeb81ba124574b83 |
| net-tools-gcc34-3 | 1.60 | net-tools-1.60-gcc34-3.patch | a92286932a423fc987f2a152931d05b0a9a312bd |
| net-tools-kernel_headers-2 | 1.60 | net-tools-1.60-kernel_headers-2.patch | 3e59377e904582503b25c7b21f6e3b77b165f84a |
| net-tools-mii_ioctl-1 | 1.60 | net-tools-1.60-mii_ioctl-1.patch | 912613acbf3a000a2935391a14e55b5ccdeeae6b |
| ntfsprogs | 1.13.1 | ntfsprogs-1.13.1.tar.gz | a1e50f6fc10fcc1e1f562ad61bcbf9a0d46ca72a |
| openssh-4.5 | 4.5p1 | openssh-4.5p1.tar.gz | 2eefcbbeb9e4fa16fa4500dec107d1a09d3d02d7 |
| openssl-0.8 | 0.8p1 | openssh-5.8p1.tar.gz | adebb2faa9aba2a3a3c8b401b2b19677ab53f0de |
| openssl-fix_manpages-1 | 0.9.8r | openssl-0.9.8r.tar.gz | a02411e5f4d463eac4a2a4a357a4a0b93bf65e72 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200** | | | |
| openssl-fips | 1.2.2 | openssl-fips-1.2.2.tar.gz | e3f94222ec2fa5fa6c39b80ae2e5329760dc3c33 |
| openssl-fips | 1.2.2 | openssl-fips-1.2.2.tar.gz.asc | f9fd60bf406e5a98e834b09b1f072ff341ebf31 |
| pkg-config | 0.22 | pkg-config-0.22.tar.gz | 3ec40bda9864d7aa3e912e6ae87a750fd8b6e420 |
| popt | 1.10.4 | popt-1.10.4.tar.gz | 19e6619e1e37aefb6fb4296aaa609b5fdd5e34d |
| ppp | 2.4.4 | ppp-2.4.4.tar.gz | 9b91b0117e0a8bfaf8e4e894af79e096ddd36259 |
| Python | 2.4.4 | Python-2.4.4.tar.bz2 | 9e0971f93df8acbd947378d0d16a32fcc8897ba2 |
| Python-gdbm-1 | 2.4.4 | Python-2.4.4-gdbm-1.patch | 34c3973ba2e519eaf1fd0ecf28ec465ed08bb96d |
| soundtouch | 1.3.1 | soundtouch-1.3.1.zip | d13437848ebe94b46b73fd5b05ba4420d4667527 |
| unzip-security_fix-1 | 5.52 | unzip-5.52-security_fix-1.patch | 7f6a287e0b480be1748abdf69429dfc76383e1d6 |
| unzip552 | 5.52 | unzip552.tar.gz | 1831bd59b9e607a69052f83b263384895e2d4a19 |
| usbutils | 0.72 | usbutils-0.72.tar.gz | 891b8825d964880146d5c980e52bb9e23d92fe2b |
| vorbis-tools | 1.1.1 | vorbis-tools-1.1.1.tar.gz | a1394b39905b389d72f12c2a9f0c86a33d07a487 |
| vorbis-tools-utf8-1 | 1.1.1 | vorbis-tools-1.1.1-utf8-1.patch | 35db6e412cc9df5d8b88b58cae5f2e514bc17823 |
| xerces-c-src | 2.8.0 | xerces-c-src_2_8_0.tar.gz | f0803b1330daec3f44b17dee64c3c99de6b3cd3e |
| xsd | 3.1.0 | xsd-3.1.0-i686-linux-gnu.tar.bz2 | a7bf9b26ff5ab577fcfeccc9ea76134da88ec7e2 |
| zip232 | 2.32 | zip232.tar.gz | 5bc562bf95d9aee0cb6625e6038898e1f191a4aa |
| **lfs_graphics-2.7.0.0v-src.tar** | | | |
| apache ant | 1.7.0 | apache-ant-1.7.0-bin.zip | 81aeb13c75edeee51dd5b1c62001fac47b127a5 |
| atk | 1.18.0 | atk-1.18.0.tar.bz2 | d58dfc3d0dad49d8c446c0bd4a0b6260d315ceb0 |
| bdftopcf | 1.0.2 | bdftopcf-1.0.2.tar.bz2 | 245778068b5e5ccde07151635ded50da9033352<br>e |
| bigreqsproto | 1.1.0 | bigreqsproto-1.1.0.tar.bz2 | 32ae0505ec963cc5c0e3ee9258b126e6865d1b1b |
| cairo | 1.8.10 | cairo-1.8.10.tar.gz | fd5e8ca82ff0e8542ea4c51612cad387f2a49df3 |
| compositeproto | 0.4.1 | compositeproto-0.4.1.tar.bz2 | fb1ae34418855c313a75e8e697b414a4935e13d6 |
| damageproto | 1.2.0 | damageproto-1.2.0.tar.bz2 | ffe177a6ae2cf023d41e015aa6ece2b191cb8a8a |
| DirectFB | 0.9.22 | DirectFB-0.9.22.tar.gz | f3a586c6540486c287cd1bcc683be0f234973ee17 |
| dmxproto | 2.3 | dmxproto-2.3.tar.bz2 | a3636d1b54d7bb273f28e0d3e44101777047865 |
| dri2proto | 2.2 | dri2proto-2.2.tar.bz2 | 21c9c0c7e0be5fc971f51589d0573b0273202b7f |
| encodings | 1.0.3 | encodings-1.0.3.tar.bz2 | 615b8367ee20fc50688e4876aa2504192 7d64cc |
| fixesproto | 4.1.1 | fixesproto-4.1.1.tar.bz2 | fb47920e629e08a56442a51968a02a2273308 5e5 |
| font-adobe-100dpi | 1.0.1 | font-adobe-100dpi-1.0.1.tar.bz2 | 814baecf5cf6e6545b7e8f3bbbad377bc3690420 |
| font-adobe-75dpi | 1.0.1 | font-adobe-75dpi-1.0.1.tar.bz2 | 3dbed8e1a6a6bba6ecd3d6e07a238f8c9ab7a26a |
| font-adobe-utopia-100dpi | 1.0.2 | font-adobe-utopia-100dpi-1.0.2.tar.bz2 | e692c3d3933c47c69656be0fd0f06218c2db138d |
| font-adobe-utopia-75dpi | 1.0.2 | font-adobe-utopia-75dpi-1.0.2.tar.bz2 | 2db0e8e2e0186831e1d68f7a2ffb2f9fe598a7280 |
| font-adobe-utopia-type1 | 1.0.2 | font-adobe-utopia-type1-1.0.2.tar.bz2 | 565d166523f59f02da02aa9e7460463 4a213643 |
| font-alias | 1.0.2 | font-alias-1.0.2.tar.bz2 | 9a0e97d9743f49e3a943b0ab77015ff15ff15d34c3 |
| font-arabic-misc | 1.0.1 | font-arabic-misc-1.0.1.tar.bz2 | d11a7bdce7500e3ccc2fe59505f2bc89e4c7aa2a |
| font-bh-100dpi | 1.0.1 | font-bh-100dpi-1.0.1.tar.bz2 | 4f3edda5dd35145cbd1ce8759e0a999b3a04f9c0 |
| font-bh-75dpi | 1.0.1 | font-bh-75dpi-1.0.1.tar.bz2 | 7b891d5bfd966c405c19574bca8f87b8803146df |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200** | | | |
| font-bh-lucidatypewriter-100dpi | 1.0.1 | font-bh-lucidatypewriter-100dpi-1.0.1.tar.bz2 | a1c9d28a619358092f7196473ff3e0f0dc5304d0 |
| font-bh-lucidatypewriter-75dpi | 1.0.1 | font-bh-lucidatypewriter-75dpi-1.0.1.tar.bz2 | 26cfd25d2802c8406a96ccc3240b2cf4e511d19f |
| font-bh-ttf | 1.0.1 | font-bh-ttf-1.0.1.tar.bz2 | 0e9ffbc738072ca832cdf5f82bff071c67b71825 |
| font-bh-type1 | 1.0.1 | font-bh-type1-1.0.1.tar.bz2 | b960d8523b02d4401dc6e1257f68dc120761ee4b |
| font-bitstream-100dpi | 1.0.1 | font-bitstream-100dpi-1.0.1.tar.bz2 | ba163df365a591de5eb9e45fa3020594572dd171 |
| font-bitstream-75dpi | 1.0.1 | font-bitstream-75dpi-1.0.1.tar.bz2 | 43344b8ff3b2c2fda8d4cdbcc12c0688b2e04789 |
| font-bitstream-type1 | 1.0.1 | font-bitstream-type1-1.0.1.tar.bz2 | 53800b904fc3ead6b577a34fb7c1f96c1af4423f |
| fontconfig | 2.8.0 | fontconfig-2.8.0.tar.gz | 570fb55eb14f2e92a7b470f041e9d35dbfbfa716 |
| font-cronyx-cyrillic | 1.0.1 | font-cronyx-cyrillic-1.0.1.tar.bz2 | dfff5974629dab97677a70fa20e21e2cf48071a0 |
| font-cursor-misc | 1.0.1 | font-cursor-misc-1.0.1.tar.bz2 | 5087a94e74f8157eb6989f71fb3b4815b236065a |
| font-daewoo-misc | 1.0.1 | font-daewoo-misc-1.0.1.tar.bz2 | d169cee1e92fe1e99f3ff6766d1e6edcbb808860 |
| font-dec-misc | 1.0.1 | font-dec-misc-1.0.1.tar.bz2 | 2489d19650f2a787b476dab2fa2412d20b95f38e |
| font-ibm-type1 | 1.0.1 | font-ibm-type1-1.0.1.tar.bz2 | 9bef72bcabfdbc218ad3a96ba2a15e92ef9cfbc3 |
| font-isas-misc | 1.0.1 | font-isas-misc-1.0.1.tar.bz2 | 13fe07a669dd93dfdb08717a03efe17936ab9eca |
| font-jis-misc | 1.0.1 | font-jis-misc-1.0.1.tar.bz2 | adb3275d19e71e9553aa8a5fdc3b2c647277d8d1 |
| font-micro-misc | 1.0.1 | font-micro-misc-1.0.1.tar.bz2 | 74a8be2b0b6ace97d8841356e88570f5fa3ffad6 |
| font-misc-cyrillic | 1.0.1 | font-misc-cyrillic-1.0.1.tar.bz2 | e178f8a8b6897a8382a0f1315a5b577760ba703e |
| font-misc-ethiopic | 1.0.1 | font-misc-ethiopic-1.0.1.tar.bz2 | 2677191fd8b515c53bde6402513249fc0f4f8d53a |
| font-misc-meltho | 1.0.1 | font-misc-meltho-1.0.1.tar.bz2 | d20d9f8ffdeb88b62842b021d5d3d2a8cc31ea2c |
| font-misc-misc | 1.1.0 | font-misc-misc-1.1.0.tar.bz2 | 83c44111b5727c26e52eb915b66dc6c9eba4c458 |
| font-mutt-misc | 1.0.1 | font-mutt-misc-1.0.1.tar.bz2 | b677831b477027f56ad3f35c95ef3cd6711f87ac |
| font-schumacher-misc | 1.1.0 | font-schumacher-misc-1.1.0.tar.bz2 | ea7e009e222379fa31a16bdbd4ca5b1e9d412944 |
| font-screen-cyrillic | 1.0.2 | font-screen-cyrillic-1.0.2.tar.bz2 | 4795ea77e14246122d21bc0fa68a3c0d5261e39d |
| font-sony-misc | 1.0.1 | font-sony-misc-1.0.1.tar.bz2 | e9717546682382ebf3e6e7039766fe52bdb8846c |
| fontsproto | 2.1.0 | fontsproto-2.1.0.tar.bz2 | 395b300fd5120a7ff90cb8fca4e2356b9632dc3e |
| font-sun-misc | 1.0.1 | font-sun-misc-1.0.1.tar.bz2 | fc91999e66fe479d07ea74e5dd2d950ff02ccb80 |
| font-util | 1.1.1 | font-util-1.1.1.tar.bz2 | 6ee3af5466de84d61411e173e578a256aeb1074d |
| font-winitzki-cyrillic | 1.0.1 | font-winitzki-cyrillic-1.0.1.tar.bz2 | d19f47671078 3d784df6fbcb6af34ef7746d3439 |
| font-xfree86-type1 | 1.0.2 | font-xfree86-type1-1.0.2.tar.bz2 | 09a4c9b8455f3f4954bfc9dd991d7fd1d0f5595a |
| freetype | 2.3.12 | freetype-2.3.12.tar.bz2 | cbf0438429e0bedd3100593260d916f6c3c91016b |
| giflib | 4.1.4 | giflib-4.1.4.tar.bz2 | 2f9aed5d20d8622700085bd2f8d4c91cf14c6067b |
| glib | 2.12.12 | glib-2.12.12.tar.bz2 | 527bced2e6d38169c08c8712d5e3b6ebb0dc46b5 |
| glproto | 1.4.11 | glproto-1.4.11.tar.bz2 | 7c2a723d488dc0e09e7e0e28bde838502d774b16 |
| gtk- | 2.10.13 | gtk-2.10.13.tar.bz2 | 8d00b928a8788ff86d97197c20c18df1f9a1b1cd |
| iceauth | 1.0.3 | iceauth-1.0.3.tar.bz2 | b75b87fed108bc4fe14ef06f76025016fa54299a |
| ImageMagick | 6.2.8-0 | ImageMagick-6.2.8-0.tar.bz2 | 637569bbcb331283c86258f6c681d5a7c849cba0 |
| inputproto | 2.0 | inputproto-2.0.tar.bz2 | 3ed9879b7dd3c14ae2283959f5962162fc01c219 |
| intltool | 0.40.6 | intltool-0.40.6.tar.bz2 | 4f8469e09e2c06a8072dffff36f84ff401d7ea75 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200** | | | |
| jdk-6u27 | 6u27 | jdk-6u27-linux-i586.bin | 7a01b0274b265662acafacddf7b5740d1a3ab0539 |
| jpeg-6b-destdir-1 | v6b | jpeg-6b-destdir-1.patch | 7b86d4c94a6350fe03f56b09563d780aa1f0cda4 |
| jpegsrc | v6b | jpegsrc.v6b.tar.gz | 7079f0d6c42fad0cfba382cf6ad322add1ace8f9 |
| jre-6u27 | 6u27 | jre-6u27-linux-i586.bin | 5a3ef2e30d4d6cf62ac6a56cec322014cf3ccab2ad |
| kbproto | 1.0.4 | kbproto-1.0.4.tar.bz2 | d30d745389d3a80d90c9a3e989651f228db486e5 |
| libdmx | 1.1.0 | libdmx-1.1.0.tar.bz2 | 8719434f167d476d53fca57c5be516c153354d60 |
| libdrm | 2.4.14 | libdrm-2.4.14.tar.bz2 | a18cc2cdfd02b8ba1c91c3e9ac609521ad3e2fe9 |
| libfontenc | 1.0.5 | libfontenc-1.0.5.tar.bz2 | e71370c349e93ba70f91ad1148ca9e5cabfcca4f |
| libICE | 1.0.6 | libICE-1.0.6.tar.bz2 | ac1f702ea580bd49661026d6b13434858b62df9e1 |
| libpciaccess | 0.11.0 | libpciaccess-0.11.0.tar.bz2 | bcebba8b8441af151b59b63e8e91e66133b64158 |
| libpng | 1.2.42 | libpng-1.2.42.tar.bz2 | e41cea7a6f5e3065f4289de3742db87ded05b99d |
| libpthread-stubs | 0.1 | libpthread-stubs-0.1.tar.bz2 | 34ef40880d0112dc6d32b386d59ce94f2e139eef |
| librsvg | 2.14.4 | librsvg-2.14.4.tar.bz2 | 9314f0d44dbfe672dc1f1a65b66821593c3bf1ce |
| libSM | 1.1.1 | libSM-1.1.1.tar.bz2 | dc535af7328dee9a6121b85c3f8041656681a195 |
| libX11 | 1.3.3 | libX11-1.3.3.tar.bz2 | 2a19724ccf78b5bb5a8eba9159d2b95e640e7b11 |
| libXau | 1.0.5 | libXau-1.0.5.tar.bz2 | b1c68843edf7e80ce952f7ee0541448f41bac202 |
| libXaw | 1.0.7 | libXaw-1.0.7.tar.bz2 | 0e5effe33c4c44d960132e3dd503701134a28f8b2 |
| libXcomposite | 0.4.1 | libXcomposite-0.4.1.tar.bz2 | 959180b067a64f3f7ae06c85400bd265c5379031 |
| libXcursor | 1.1.10 | libXcursor-1.1.10.tar.bz2 | 096d0e538d37fd865705e5f45b0e96c7294c1f2f |
| libXdamage | 1.1.2 | libXdamage-1.1.2.tar.bz2 | dc1f0e938e9bbc859c70cf2087440fc15b00bb1e |
| libXdmcp | 1.0.3 | libXdmcp-1.0.3.tar.bz2 | 7efd71d29d6cfba797b8791398e4d81bdc677d77 |
| libXext | 1.1.1 | libXext-1.1.1.tar.bz2 | a2eb8d8d760c6881e51e938812764d1d6eefd51e |
| libXfixes | 4.0.4 | libXfixes-4.0.4.tar.bz2 | 3f2d1e4738558ba0ef13137a80d585dff7fe37111e |
| libXfont | 1.4.1 | libXfont-1.4.1.tar.bz2 | f8dc669760975b4188514318f828b54164224c8a31 |
| libXft | 2.1.14 | libXft-2.1.14.tar.bz2 | b08ac6b1f56c160179b9f041bfab799333ec725e |
| libXi | 1.3 | libXi-1.3.tar.bz2 | 7685f2881c610b13028d9409edbb9cf1ed0d8ef |
| libXinerama | 1.1 | libXinerama-1.1.tar.bz2 | 5f145194ef3318f66c287c0c69f778988a3f9266 |
| libxkbfile | 1.0.6 | libxkbfile-1.0.6.tar.bz2 | 6364e0679eb893d6fbb6adcf0e8230cfdefe0b68 |
| libXmu | 1.0.5 | libXmu-1.0.5.tar.bz2 | c7ff5960f2374852b941f909edbdcafc7d29322f |
| libXpm | 3.5.8 | libXpm-3.5.8.tar.bz2 | 3bfc833ed1527f74b1c66c386da62271d0313f13 |
| libXrandr | 1.3.0 | libXrandr-1.3.0.tar.bz2 | 33dd2f67060465f872db9ea03f597e28517f0c8e |
| libXrender | 0.9.5 | libXrender-0.9.5.tar.bz2 | 278f762feb8e754aa5214175abf580ff48628117 |
| libXres | 1.0.4 | libXres-1.0.4.tar.bz2 | d5ee9560a61666e6bb3d2285b9634fccd7211d65 |
| libXScrnSaver | 1.2.0 | libXScrnSaver-1.2.0.tar.bz2 | ea2935eb67efa77fd90372337f2d782a8ef74cea |
| libXt | 1.0.7 | libXt-1.0.7.tar.bz2 | 3c285b9c04a393dec1cc3d60cf5582d798eb3272 |
| libXtst | 1.1.0 | libXtst-1.1.0.tar.bz2 | 4363e9285bfb5a884073efacc50d39edb803a1a5 |
| libXv | 1.0.5 | libXv-1.0.5.tar.bz2 | 3936dd661e75d173b9fd1da9db7e5720e9657254 |
| libXvMC | 1.0.5 | libXvMC-1.0.5.tar.bz2 | 153b85884f22b882cecb9fc162fe24c669a80dbd |
| libXxf86dga | 1.1.1 | libXxf86dga-1.1.1.tar.bz2 | a93004cfbe4fd6bc37e6645705d5a6d90c0940b7 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200** | | | |
| libXxf86vm | 1.1.0 | libXxf86vm-1.1.0.tar.bz2 | f5ec7854f201d9e69dfddd13123b517f97b69ad7 |
| makedepend | 1.0.2 | makedepend-1.0.2.tar.bz2 | 57e092856580d9984e47c4b1433b69391de07df3 |
| mkfontdir | 1.0.5 | mkfontdir-1.0.5.tar.bz2 | 971728b0f453ea5df028aa5d54fe3fbdb8e99a7d |
| mkfontscale | 1.0.7 | mkfontscale-1.0.7.tar.bz2 | 0a0e25da68c87380e2c013e808a6e0cc0983fae9 |
| pango | 1.16.4 | pango-1.16.4.tar.bz2 | 6a21126632cd99950818c64d8598b6c92fa7da58 |
| pixman | 0.15.20 | pixman-0.15.20.tar.gz | a5f973b6895e269731964fbe328f61a8cbfdc931 |
| randrproto | 1.3.1 | randrproto-1.3.1.tar.bz2 | 36731ba6e815453af4b055e26ad8e9e2653ca05 |
| recordproto | 1.14 | recordproto-1.14.tar.bz2 | 212928572898cd150366e6026e2694b193f9f79 |
| renderproto | 0.11 | renderproto-0.11.tar.bz2 | d30cf508b1a1b5f0deb1e6db11ba2f4e57680632 |
| resourceproto | 1.1.0 | resourceproto-1.1.0.tar.bz2 | 36b86840005c15e393e86d7075688d430ab2a11d |
| scrnsaverproto | 1.2.0 | scrnsaverproto-1.2.0.tar.bz2 | e734cfe9a1ee57fd42957389dcc90518fd7ea6b6 |
| sessreg | 1.0.5 | sessreg-1.0.5.tar.bz2 | d1dac6a398b23ed44db67286ec083e9071bd00e7 |
| setxkbmap | 1.1.0 | setxkbmap-1.1.0.tar.bz2 | f02f93a08ac060d760566693e748c0fba3db8a06 |
| smproxy | 1.0.3 | smproxy-1.0.3.tar.bz2 | 1bad4a4a58b05d6a6f7e4b1f67b793dee2eef2ba |
| splashy | 0.3.12 | splashy-0.3.12.tar.gz | 4e721222b20b8fd3fbb8c815ed5e0f05eeead68a |
| tiff | 3.8.2 | tiff-3.8.2.tar.gz | 549e67b6a15b42bfed72fe17e4a7e9a198a393d6 |
| twm | 1.0.4 | twm-1.0.4.tar.bz2 | 7456e90f19e4747e1785f596b93f692d68a9f079 |
| util-macros | 1.5.0 | util-macros-1.5.0.tar.bz2 | ac61387bc2a0b97f839041832bd8d06c03efc942 |
| videoproto | 2.3.0 | videoproto-2.3.0.tar.bz2 | 4aef2b138d15b3ab75e640996ce1267d3468f18c |
| x11perf | 1.5.1 | x11perf-1.5.1.tar.bz2 | d1f85da3df5b216b64c1735d1093802147872222d |
| xauth | 1.0.4 | xauth-1.0.4.tar.bz2 | 90d32f28bb61ca6d831dcc35429a5ad53be73283 |
| xbacklight | 1.1.1 | xbacklight-1.1.1.tar.bz2 | 3541ab5e0956bf0c97b1200dc32a35d2ccb0f0f |
| xbitmaps | 1.1.0 | xbitmaps-1.1.0.tar.bz2 | 845b825f7e6d193d47db8b67ae8332d87ef8c2b3 |
| xclock | 1.0.4 | xclock-1.0.4.tar.bz2 | 1987cafb3163e6b68bc7ecfbe143c8cd373d64bb |
| xcmiscproto | 1.2.0 | xcmiscproto-1.2.0.tar.bz2 | 1a55e042b33c0e0aaf2299942315a5208d644707 |
| xcmsdb | 1.0.2 | xcmsdb-1.0.2.tar.bz2 | 8341f7219a5720da758b0571eb1f4d9072265485 |
| xcursorgen | 1.0.3 | xcursorgen-1.0.3.tar.bz2 | 7df26b371476654dc191e45e7d20ae3a5e0cad87 |
| xcursor-themes | 1.0.2 | xcursor-themes-1.0.2.tar.bz2 | 120865c17e65e70a6bc20300dfa660fe8faaa0a4 |
| xdpyinfo | 1.1.0 | xdpyinfo-1.1.0.tar.bz2 | 01971f00704884e46a4a31a69c661bc3a378de60f0 |
| xdriinfo | 1.0.3 | xdriinfo-1.0.3.tar.bz2 | d211d6f12f4c801d2f4cf184c6daae37aa5858ff |
| xev | 1.0.4 | xev-1.0.4.tar.bz2 | 4f82e131be06842eef1660e88695337af3923ac35 |
| xextproto | 7.1.1 | xextproto-7.1.1.tar.bz2 | 1bb4bd12d65a17b3168de9b4e028b33a2f7b2cad |
| xf86bigfontproto | 1.2.0 | xf86bigfontproto-1.2.0.tar.bz2 | 312a2ea708b257520c1af4393b69d73a393a478f |
| xf86dgaproto | 2.1 | xf86dgaproto-2.1.tar.bz2 | 97a06120e7195c968875e8ba42e82c90ab34948b |
| xf86driproto | 2.1.0 | xf86driproto-2.1.0.tar.bz2 | 0dfc6616ffc68ca3c3b5dccb1c365aaa93bc8548 |
| xf86-input-keyboard | 1.4.0 | xf86-input-keyboard-1.4.0.tar.bz2 | 5061fdaff8b7ddebeca82f065c4abbfff255a1da |
| xf86-input-mouse | 1.5.0 | xf86-input-mouse-1.5.0.tar.bz2 | b9213bf745b793a3da2c946ea4d8ee576e560f4 |
| xf86-video-vesa | 2.3.0 | xf86-video-vesa-2.3.0.tar.bz2 | 4689b7c295d7a8d7326302dafecb8127396171 34 |
| xf86vidmodeproto | 2.3 | xf86vidmodeproto-2.3.tar.bz2 | 22d084c2f66985f8541b9ea3421096eea006555 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS200** | | | |
| Xgamma | 1.0.3 | xgamma-1.0.3.tar.bz2 | f9c7d93f4b271bab411ea3e91b371d52572e1d08c |
| xhost | 1.0.3 | xhost-1.0.3.tar.bz2 | ebedecdc908e612e527ecbbdc6ba8084d90e04f6 |
| xineramaproto | 1.2 | xineramaproto-1.2.tar.bz2 | 3e397c9ea38aaae785dd7901f250891dfa7f5249 |
| xinit | 1.2.0 | xinit-1.2.0.tar.bz2 | 85a838e2014f27af6d09d6ee1b1208a66ee8d697 |
| xinput | 1.5.0 | xinput-1.5.0.tar.bz2 | 02d1eee83007aa7848b1b024ae64e310303f973e |
| xkbcomp | 1.1.1 | xkbcomp-1.1.1.tar.bz2 | aeb733e195d7affd42136bf8ae5c6e792e63f0b4b |
| xkbevd | 1.1.0 | xkbevd-1.1.0.tar.bz2 | b510b4a1b7486beacb5570e204f7fdd4b61f0ab4 |
| xkbutils | 1.0.2 | xkbutils-1.0.2.tar.bz2 | 2e025038ca12ee2494b2401ea2c12e74fe88bf91 |
| xkeyboard-config | 1.7 | xkeyboard-config-1.7.tar.bz2 | d6df13bfc0596be01865f2be7c4e794e198358c8 |
| xkill | 1.0.2 | xkill-1.0.2.tar.bz2 | 90f08652859daf71b682c3b9163ebf72ce88c4bc |
| xlsatoms | 1.0.2 | xlsatoms-1.0.2.tar.bz2 | 3855734b5ec0d43b5886ac0ffa58d7cf96f46926 |
| xlsclients | 1.0.2 | xlsclients-1.0.2.tar.bz2 | 5cde39a28c5352d1d5557148361f57c05197e419d |
| XML-Parser | 2.36 | XML-Parser-2.36.tar.gz | 74acac4f939ebf788d8ef5163cbc9802b1b04bfa |
| xmodmap | 1.0.4 | xmodmap-1.0.4.tar.bz2 | 9b49388bb527a8f7b7e86c4aa4c75a83372f6baa |
| xorg-server | 1.7.1 | xorg-server-1.7.1.tar.bz2 | d31e259b3ab975e2c1baea8f7310b57152ae3c62 |
| xpr | 1.0.3 | xpr-1.0.3.tar.bz2 | 9dbd0ff136b612285e00d92d0c7675a4207b1c4a |
| xprop | 1.1.0 | xprop-1.1.0.tar.bz2 | 16b377c76a4a010200063a056e7a5e244ab6ff00 |
| xproto | 7.0.16 | xproto-7.0.16.tar.bz2 | 0eda5588d42f2c810d8491da44fe84a4093ef2be |
| xrandr | 1.3.2 | xrandr-1.3.2.tar.bz2 | 0e49b0a0889ac8a590452e6cd0d60a2253a8d940 |
| xrdb | 1.0.6 | xrdb-1.0.6.tar.bz2 | e4faff5e02b3027298dc589e318a6dc7eb30a6d5 |
| xrefresh | 1.0.3 | xrefresh-1.0.3.tar.bz2 | 3f34eeea9509f47e60ddfef14a98225eaffeba705 |
| xset | 1.1.0 | xset-1.1.0.tar.bz2 | f7429544282182f6092b17248c1ad65c16cd860cf |
| xsetmod | 1.0.3 | xsetmod-1.0.3.tar.bz2 | 56ed1df9834627a107550475629df51275ed0e44 |
| xterm | 251 | xterm-251.tgz | 934811737745b76ca75bf940fcb97594 3bf10840 |
| xtrans | 1.2.5 | xtrans-1.2.5.tar.bz2 | a8e4ce58f42d05e613fc533519a7d7f45f30f3c9 |
| xvinfo | 1.1.0 | xvinfo-1.1.0.tar.bz2 | 8695bfb597dbf3ed8e3277fddde4722da21baaa3 |
| xwd | 1.0.3 | xwd-1.0.3.tar.bz2 | f6708d14040630d1d32559876 28cfcbf7ace05aa |
| xwininfo | 1.0.5 | xwininfo-1.0.5.tar.bz2 | 9730db0d1bd75b8bc5bc399f56cab9f5aee3bcfc |
| xwud | 1.0.2 | xwud-1.0.2.tar.bz2 | 15a6c5e3ffc03b7e8e597947061940fee6c0a9fc |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS850** | | | |
| BAPIS | 412 | COTS-412.tar.bz2 | 07e13f7efb1cec055f916a2a55bad02a0b1b92608 |
| cryptocme | 3.0 | cryptocme-3.0-rhel30.tar.gz | 4fc8c6a6ddbf524cfa88c3c6cf195447afc67977 |
| Linux From Scratch | 6.2.5 | lfslivecd-x86-6.2-5.iso | b3e3947bf2e3616fa45541e0643a2adfa0618207 |
| **lfs_enhanced-2.4.0.0m-src.tar** | | | |
| alsa-lib | 1.0.13 | alsa-lib-1.0.13.tar.bz2 | 82fa9a7febd3b319524b18151ea86d691a20f1a3 |
| alsa-utils | 1.0.13 | alsa-utils-1.0.13.tar.bz2 | 05b160a0e7ae6519ea3724047f6f026b59dbc710d |
| aumix | 2.8 | aumix-2.8.tar.bz2 | 5cea563ae91f628433a1950a36efd23681da4bf4 |
| beecrypt | 4.1.2 | beecrypt-4.1.2.tar.gz | 71cebd3329bb2561ffba24a2004dfac50b143f59 |
| blfs-bootscripts | 20060910 | blfs-bootscripts-20060910.tar.bz2 | 58ff10492f9abceed6ca4a1a5c479d5f2e3e8002 |
| BLFS-ca-bundle | 3.12.5 | BLFS-ca-bundle-3.12.5.tar.bz2 | 8cf4be3072184940f8cfc3888af0ba1cb58a5377 |
| boost | 1.43.0 | boost_1_43_0.tar.bz2 | b8257b7da2a7222739314f8d1e07e217debe71d6 |
| chkrootkit | 0.49 | chkrootkit-0.49.tar.gz | cec1a3c482b95b20d3a946b07ffffb23290abc4a6 |
| coreutils | 6.9 | coreutils-6.9.tar.bz2 | 10310a78c4e1d9f742f3815ac28e9bf1086a5885 |
| cpio | 2.6 | cpio-2.6.tar.gz | 5a4ea156519909994fe05933dc823abcf07e3e21 |
| cpio-security_fixes-1 | 2.6 | cpio-2.6-security_fixes-1.patch | d84452560321b903bbd3cee2694e87412e7dca843 |
| ctags | 5.6 | ctags-5.6.tar.gz | 930afaa138624717393fe475201f795251bd5e5e |
| curl | 7.15.3 | curl-7.15.3.tar.bz2 | 7e764126ce564429fe2f142428a27cbfc8fb69ee |
| cvs | 1.11.22 | cvs-1.11.22.tar.bz2 | 5dfa11da84a890d7d61516fd450c001dc24bcc0d |
| cvs-zlib-1 | 1.11.22 | cvs-1.11.22-zlib-1.patch | 0d20bab8a6b6e419a8c900d082b487ad6a3ace38 |
| dnidecode | 2.9 | dnidecode-2.9.tar.bz2 | 0346690d32120b9fff22accd5b4e731414a3676b |
| docbook-xsl | 1.69.1 | docbook-xsl-1.69.1.tar.bz2 | aaahf0e2746091f4e187a6e36d2be23f3471f507 |
| dosfstools | 2.11 | dosfstools-2.11.src.tar.gz | b0d8714475ea7c7a96a46adf7a4839d69ec2f412 |
| expat | 2.0.1 | expat-2.0.1.tar.gz | 663548c37b996082db1f2f2c32af06bd7aa15c2d |
| fuse | 2.6.1 | fuse-2.6.1.tar.gz | 85cc1458d0ab2647b6b13605f0200006d89981ed |
| gnupg | 1.4.3 | gnupg-1.4.3.tar.bz2 | 9c96b36e4f4d1c8bc5028c99fac674482cfdb370 |
| gpm | 1.20.1 | gpm-1.20.1.tar.bz2 | c18d937c62abbf38c2f6439b3fcf3332c89af8d1 |
| gpm-segfault-1 | 1.20.1 | gpm-1.20.1-segfault-1.patch | da53bf78a0ebaa5020e332aa6d68611591700d86 |
| gpm-silent-1 | 1.20.1 | gpm-1.20.1-silent-1.patch | 8899a212eadfbda201d8da3e14590bd05b97f9f6 |
| libao | 0.8.6 | libao-0.8.6.tar.gz | 2050e008ffcfd6803e2c2c03c7d5f469b6d8379e |
| libogg | 1.1.3 | libogg-1.1.3.tar.gz | a3e495a8baf6939efad7c0bd11ce0e166838e3db |
| libusb | 0.1.12 | libusb-0.1.12.tar.gz | 599a516859ff66bc6f1f9a299579fd8500614807 |
| libvorbis | 1.1.2 | libvorbis-1.1.2.tar.gz | 26289fc41aa543cb1a277d726bb5cb106d675c35 |
| libxml2 | 2.6.31 | libxml2-2.6.31.tar.gz | 97233a210425bad96b35e52aa3e0010ac11bbcc9 |
| libxslt | 1.1.22 | libxslt-1.1.22.tar.gz | 55ce4dc659681d9a5ba2322e45cbdfe75b46639c |
| logrotate | 3.7.8 | logrotate-3.7.8.tar.gz | 5742dc0d9541ac59eba5f5718520f7504aea2159 |
| LPRng | 3.8.28 | LPRng-3.8.28.tgz | f4373004adb143981960070 1bb98517137daf1fc |
| net-tools | 1.60 | net-tools-1.60.tar.bz2 | 9441b70641505d5d1139dba3aeb81ba124574b83 |
| net-tools | 1.60 | net-tools-1.60.tar.gz | 4e8100957be645241d685055ebdde9d5c744cb54 |
| net-tools-gcc34-3 | 1.60 | net-tools-1.60-gcc34-3.patch | a92286932a423fc987f2a152931d05b0a9a312bd |
| net-tools-gcc34-3 | 1.60 | net-tools-1.60-gcc34-3.patch | a92286932a423fc987f2a152931d05b0a9a312bd |
| net-tools-kernel_headers-2 | 1.60 | net-tools-1.60-kernel_headers-2.patch | 5e59577e9f03825f03b25e7b21f6e5b77b165f84a |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS850** | | | |
| net-tools-kernel_headers-2 | 1.60 | net-tools-1.60-kernel_headers-2.patch | 3e59577e904582503b25c7b21f6e3b77b165f84a |
| net-tools-mii_ioctl-1 | 1.60 | net-tools-1.60-mii_ioctl-1.patch | 912613acbf3a000a2935391a14e55b5cedeeae6b |
| net-tools-mii_ioctl-1 | 1.60 | net-tools-1.60-mii_ioctl-1.patch | 912613acbf3a000a2935391a14e55b5cedeeae6b |
| nfsprogs | 1.1.3.1 | nfsprogs-1.1.3.1.tar.gz | a4e50f6fc10fee1e1f562ad64bcbf9a0d46ca72a |
| nul | 2.2.2 | nul-2.2.2.tar.gz | f54ce909b229931fb91b4a660f0447b539d4ca6b |
| openssh | 4.5p1 | openssh-4.5p1.tar.gz | 2ecfcbbcb9e1fa16fa1500dee107d1a09d3d02d7 |
| openssl | 0.9.8n | openssl-0.9.8d-fix_manpages-1.patch | afb498051e466131ae90dfc67823 4e8876af88a1 |
| openssl-fix_manpages-1 | 0.9.8n | openssl-0.9.8n.tar.gz | 595f3ebf5925685159 64f0adc62239e7012ef08b |
| pkg-config | 0.22 | pkg-config-0.22.tar.gz | 3ec40bda9864d7aa3e912c66e87a750fd8b6e426 |
| popt | 1.10.4 | popt-1.10.4.tar.gz | 10c6649c4c37ccfb6fb4296aaa609b5fdd5e34d |
| ppp | 2.4.4 | ppp-2.4.4.tar.gz | 9b91b0117e0a8bfaf8e4e894af79e0960dd36259 |
| Python | 2.4.4 | Python-2.4.4.tar.bz2 | 9e0971f93df8aebd947378d0d16a32fcc8897ba2 |
| Python-gdbm-1 | 2.4.4 | Python-2.4.4-gdbm-1.patch | 84c3973ba2c519caf1fd0ecf28cc465cd08bb96d |
| unzip552 | 5.52 | unzip-5.52-security_fix-1.patch | 7f6a287e0bf80bc1748abdf69429dfc76383e1d6 |
| unzip-security_fix-1 | 5.52 | unzip552.tar.gz | 1831bd59b9c607a69052f83b263384895c2d4a19 |
| usbutils | 0.72 | usbutils-0.72.tar.gz | 891b8825d964880146d5c980c52bb9c23d92f62b |
| vorbis-tools | 1.1.1 | vorbis-tools-1.1.1.tar.gz | a1394b39905b389d72f12e2a9f0c86a63d07a487 |
| vorbis-tools-utf8-1 | 1.1.1 | vorbis-tools-1.1.1-utf8-1.patch | 35db6e412ce9df5d8b88b58cae5f2c514bc17823 |
| xerces-c-src | 2.8.0 | xerces-c-src_2_8_0.tar.gz | f0803b1330daec3f4b17dee61c3c99de6b3cd3e |
| xsd | 3.1.0-i686-linux-gnu | xsd-3.1.0-i686-linux-gnu.tar.bz2 | a7bf9b26ff5ab577fcfeccc9ea76134da88ec7e2 |
| zip232 | 2.32 | zip232.tar.gz | 5bc562b95d9acc0cb6625c6038898e1f191044aa |
| **lfs_graphics-2.4.0.0m-src.tar** | | | |
| a2ps | 4.14 | a2ps-4.14.tar.gz | 365abbbe1b7128bf70dad16d06c23c5701874852 |
| atk | 1.18.0 | atk-1.18.0.tar.bz2 | d58dfc3dbdad19d8c446e0bdfa0b6260d515ceb0 |
| bdftopcf | 1.0.2 | bdftopcf-1.0.2.tar.bz2 | 2452780 68b5e5eada37151635daf50da90333524 |
| bigreqsproto | 1.1.0 | bigreqsproto-1.1.0.tar.bz2 | 32ac0505e963ee5e0c3e9258b126c6865d1b1b |
| cairo | 1.4.14 | cairo-1.4.14.tar.gz | 633102 43ba8af949060b06c01fc28ee5471ed5a1 |
| compositeproto | 0.4.1 | compositeproto-0.4.1.tar.bz2 | fb1ae34418855c313a75e8e697b414a4935e13d6 |
| damageproto | 1.2.0 | damageproto-1.2.0.tar.bz2 | ffe177a6ae2cf023d41e015aa6ece2b191cb8a8a |
| DirectFB | 0.9.22 | DirectFB-0.9.22.tar.gz | f3a586cc654086c287cd1bcc683be0f231973ee17 |
| dmxproto | 2.3 | dmxproto-2.3.tar.bz2 | a3636d1b54d7bbf273f28c0d3c44101777047865 |
| dri2proto | 2.2 | dri2proto-2.2.tar.bz2 | 21e9c0c7e0be5fe971f51589d0573b0273202b7f |
| encodings | 1.0.3 | encodings-1.0.3.tar.bz2 | 615b8367ee20fc50688e4876aa250419927d64cc |
| fbida | 2.07 | fbida-2.07.tar.gz | 4758178299e09d5251b9cf20337a81cc20553d45 |
| fixesproto | 4.1.1 | fixesproto-4.1.1.tar.bz2 | fb47920c629e08a56442a51968a02a22733085e5 |
| font-adobe-100dpi | 1.0.1 | font-adobe-100dpi-1.0.1.tar.bz2 | 814baccf3cf6c6545b7e8f3bbbad377be369042d |
| font-adobe-75dpi | 1.0.1 | font-adobe-75dpi-1.0.1.tar.bz2 | 3cbed8a4a3a6bbe6ccd3d6e07a238f8c9ab7a26c |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS850** | | | |
| font-adobe-utopia-100dpi | 1.0.2 | font-adobe-utopia-100dpi-1.0.2.tar.bz2 | e692e3d3933e47c69656be0fd0f06218e2db138d |
| font-adobe-utopia-75dpi | 1.0.2 | font-adobe-utopia-75dpi-1.0.2.tar.bz2 | 2db08e2e0186831e1d68f7a2ffb2f9fe598a7280 |
| font-adobe-utopia-type1 | 1.0.2 | font-adobe-utopia-type1-1.0.2.tar.bz2 | 565db66523f59f02da02aa9e74604634a2113643 |
| font-alias | 1.0.2 | font-alias-1.0.2.tar.bz2 | 9a0e97d974349e3a943b0ab77015f115f15d34e3 |
| font-arabic-misc | 1.0.1 | font-arabic-misc-1.0.1.tar.bz2 | d11a7bdce7500e3ccc2fe59505f2bc89e1c7aa2a |
| font-bh-100dpi | 1.0.1 | font-bh-100dpi-1.0.1.tar.bz2 | 4f3edda5dd35145cbd1ce8759e0a999b3a04f9c0 |
| font-bh-75dpi | 1.0.1 | font-bh-75dpi-1.0.1.tar.bz2 | 7b891d5bfd966c405c19574bca8f87b8803146d1 |
| font-bh-lucidatypewriter-100dpi | 1.0.1 | font-bh-lucidatypewriter-100dpi-1.0.1.tar.bz2 | a1e9d28a619358092f7196473ff3a0f0de5304d0 |
| font-bh-lucidatypewriter-75dpi | 1.0.1 | font-bh-lucidatypewriter-75dpi-1.0.1.tar.bz2 | 26efd25d2802c8406a96ccc3240b2c14e511d49f |
| font-bh-ttf | 1.0.1 | font-bh-ttf-1.0.1.tar.bz2 | 0c9ffbc738072ca832edf3f82bff071a67b71825 |
| font-bh-type1 | 1.0.1 | font-bh-type1-1.0.1.tar.bz2 | b960d8523b02d4401de6c1257f68de120761ec4b |
| font-bitstream-100dpi | 1.0.1 | font-bitstream-100dpi-1.0.1.tar.bz2 | ba163df365a591de5eb9e45fa302059d572dd171 |
| font-bitstream-75dpi | 1.0.1 | font-bitstream-75dpi-1.0.1.tar.bz2 | 43344b8ff3b2c2fda8d4cdbee12e0688b2e07989 |
| font-bitstream-type1 | 1.0.1 | font-bitstream-type1-1.0.1.tar.bz2 | 53800b904fe3cad6b577a34fb7e1f96e1af4423f |
| fontconfig | 2.8.0 | fontconfig-2.8.0.tar.gz | 570fb55eb14f2c92a7b170b941e9d35dbfafa716 |
| font-cronyx-cyrillic | 1.0.1 | font-cronyx-cyrillic-1.0.1.tar.bz2 | dfff5974629dab97677a70fa20e21c2cf48071a0 |
| font-cursor-misc | 1.0.1 | font-cursor-misc-1.0.1.tar.bz2 | 5087a94e74f8157eb6989f71fb3b4815b236065a |
| font-daewoo-misc | 1.0.1 | font-daewoo-misc-1.0.1.tar.bz2 | d169cec1e92fe1e99f3ff6766dd1c6edcbb808860 |
| font-dec-misc | 1.0.1 | font-dec-misc-1.0.1.tar.bz2 | 2489d19650f2a787b476dab2fa2412d20b95f38e |
| font-ibm-type1 | 1.0.1 | font-ibm-type1-1.0.1.tar.bz2 | 9bcf72bcabfcbe218ad3a96ba2a45e92ef9efbc3 |
| font-isas-misc | 1.0.1 | font-isas-misc-1.0.1.tar.bz2 | 13fe07a669dd93dfdb08717a03efe47936ab9cea |
| font-jis-misc | 1.0.1 | font-jis-misc-1.0.1.tar.bz2 | adb3275d19e71e9553aa8a5fdc3b2c647277d8d4 |
| font-micro-misc | 1.0.1 | font-micro-misc-1.0.1.tar.bz2 | 74a8be2b0b6ace97d8841356e88570f5fa3faad6 |
| font-misc-cyrillic | 1.0.1 | font-misc-cyrillic-1.0.1.tar.bz2 | c1781a8b6897a8382a0f4315a5b577760ba703c |
| font-misc-ethiopic | 1.0.1 | font-misc-ethiopic-1.0.1.tar.bz2 | 2677191fd8b515c53bde640251324ffc0f48d53a |
| font-misc-meltho | 1.0.1 | font-misc-meltho-1.0.1.tar.bz2 | d20d9f8ffdeb88b62842b021d5d3d2a3cc31ea2c |
| font-misc-misc | 1.1.0 | font-misc-misc-1.1.0.tar.bz2 | 83c44111b5727c26e52eb915b666dc6c9eba4c458 |
| font-mutt-misc | 1.0.1 | font-mutt-misc-1.0.1.tar.bz2 | b677831b477027f36ad3f35c95ef3cd6711f87ac |
| font-schumacher-misc | 1.1.0 | font-schumacher-misc-1.1.0.tar.bz2 | ea7e009e222379fa31a16bdbd4ca5b1e9d412944 |
| font-screen-cyrillic | 1.0.2 | font-screen-cyrillic-1.0.2.tar.bz2 | 4795ea77e14246122d21be0fa68a3c0d5261a59d |
| font-sony-misc | 1.0.1 | font-sony-misc-1.0.1.tar.bz2 | e971754668238 2cbf3e6ic7039766fe52bdb8846c |
| fontsproto | 2.1.0 | fontsproto-2.1.0.tar.bz2 | 395b300fd5120a7ff90cb8fea4e2356b9632dc3e |
| font-sun-misc | 1.0.1 | font-sun-misc-1.0.1.tar.bz2 | fc91999e66fe479d07ea74e5dd2d950f02cdc80 |
| font-util | 1.1.1 | font-util-1.1.1.tar.bz2 | 6ec3af5466dc84d6141e173c578a256acb1074d |
| font-winitzki-cyrillic | 1.0.1 | font-winitzki-cyrillic-1.0.1.tar.bz2 | d19f4767107583d784dfdbcb6a1f34cf7246d3439 |
| font-xfree86-type1 | 1.0.2 | font-xfree86-type1-1.0.2.tar.bz2 | 09a4e9b8455f3f4954bfc9dd991d7fd1d0f5595a |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS850** | | | |
| freetype | 2.3.12 | freetype-2.3.12.tar.bz2 | eb0f038429e0bcdd3700593626d91646e3e910f6b |
| giflib | 4.1.4 | giflib-4.1.4.tar.bz2 | 2f9acd5d20d862270008bd2f8d4e91cf14c6067b |
| glib | 2.12.12 | glib-2.12.12.tar.bz2 | 527bced2e6d38169c08c8712d5e3b6ebb0dc46b5 |
| glproto | 1.4.11 | glproto-1.4.11.tar.bz2 | 7e2a723d488dc0a09e7c0e28bdc838502d774b16 |
| gperf | 3.0.3 | gperf-3.0.3.tar.gz | 3c535d2727eb0dea10a87ccfa03720a8280c7a2 |
| gtk- | 2.10.13 | gtk+-2.10.13.tar.bz2 | 8d00b928a8788ff86d97197c20c18d1f9a1b1cd |
| iceauth | 1.0.3 | iceauth-1.0.3.tar.bz2 | b75b87fed108bc4fe14ef06f76025016fa54299a |
| ImageMagick | 6.2.8-0 | ImageMagick-6.2.8-0.tar.bz2 | 6375699bcb331233c86258f6c681d5a7c849cba0 |
| inputproto | 2.0 | inputproto-2.0.tar.bz2 | 3ed9879b7dd3c14ae2283959f5962162fc01c219 |
| intltool | 0.40.6 | intltool-0.40.6.tar.bz2 | 4f6469e09e2c06a8072dfff36f84ff401d7ea75 |
| jpeg-6b-destdir-1 | v6b | jpeg-6b-destdir-1.patch | 7b86d4e94a6350fc03f56b09565d780aa1f9eda4 |
| jpegsrc | v6b | jpegsrc.v6b.tar.gz | 7079f0d6e42fad0cfba382cf6ad322add1ace8f9 |
| kbproto | 1.0.4 | kbproto-1.0.4.tar.bz2 | d300745389d3a80d90c9a3c9f8965ff228db486e5 |
| libdmx | 1.1.0 | libdmx-1.1.0.tar.bz2 | 8719434f167d476d53fca57c5be516c153354d60 |
| libdrm | 2.4.14 | libdrm-2.4.14.tar.bz2 | a18cc2cdfd02b8ba1c91c3e9ac609521ad3e2fe9 |
| libexif | 0.6.19 | libexif-0.6.19.tar.bz2 | 820f07ff12a8cc720a6597d46277f0149Sc8aba4 |
| libfontenc | 1.0.5 | libfontenc-1.0.5.tar.bz2 | e71370e349e93ba70f91ad1148ca9e5cabfcca4f |
| libFS | 1.0.2 | libFS-1.0.2.tar.bz2 | 41af53fae37210acaa034199f01f36af3f3ec548 |
| libICE | 1.0.6 | libICE-1.0.6.tar.bz2 | ac1f702ca580bdd9661026bb1343485Sb62df9e1 |
| libpciaccess | 0.11.0 | libpciaccess-0.11.0.tar.bz2 | bcebba8b8441aff151b59b63e8e91e66133b64158 |
| libpng | 1.2.42 | libpng-1.2.42.tar.bz2 | e41cea7a6f5e3063f4289de3742db87ded05b99d |
| libpthread-stubs | 0.1 | libpthread-stubs-0.1.tar.bz2 | 34ef40880d0112dc6d32b686d59ee94f2e139ecf |
| librsvg | 2.14.4 | librsvg-2.14.4.tar.bz2 | 9314f0d44dbfc672de1f1a65b66821593c3bf1ee |
| libSM | 1.1.1 | libSM-1.1.1.tar.bz2 | de535af7328dee9a6121b85c3f8011656681a195 |
| libX11 | 1.3.3 | libX11-1.3.3.tar.bz2 | 2a19724ecf78b5bb5a8eba91589d2b95e640c7b11 |
| libXau | 1.0.5 | libXau-1.0.5.tar.bz2 | b1c68843ecff7e80ee952f7ee0541448f11bac202 |
| libXaw | 1.0.7 | libXaw-1.0.7.tar.bz2 | 0e5effe33e4e44d960132e3dd50370134428f8b2 |
| libXcomposite | 0.4.1 | libXcomposite-0.4.1.tar.bz2 | 959180b067c64f3f7ac06e85400bd265e5579031 |
| libXcursor | 1.1.10 | libXcursor-1.1.10.tar.bz2 | 096d0e538d37fd865705e5f45b0e96c7294c1f2f |
| libXdamage | 1.1.2 | libXdamage-1.1.2.tar.bz2 | de1fbe938e9bbe859e70ef2087440fe15b00bb1e |
| libXdmcp | 1.0.3 | libXdmcp-1.0.3.tar.bz2 | 7efd71d29d6cfba797b8791398e4d81ade677d77 |
| libXext | 1.1.1 | libXext-1.1.1.tar.bz2 | e2eb8d8d760c6881e51c938812764d1d6cefd51c |
| libXfixes | 4.0.4 | libXfixes-4.0.4.tar.bz2 | 3f2d1c473855ba0cf13137a80d585df7fe37111c |
| libXfont | 1.4.1 | libXfont-1.4.1.tar.bz2 | f8dc669760975b41885143f828b54164224c8a31 |
| libXft | 2.1.14 | libXft-2.1.14.tar.bz2 | e08ae6b1f56e160179b9f141b4ab799333ec725e |
| libXi | 1.3 | libXi-1.3.tar.bz2 | 7685f2881ce40b13028d9409eedbb9cf1ed0d8ef |
| libXinerama | 1.1 | libXinerama-1.1.tar.bz2 | 5f445194ef3318f66c287e0c69f778988a3f9266 |
| libxkbfile | 1.0.6 | libxkbfile-1.0.6.tar.bz2 | 6364e0679eb893d6fbb6adcf0e8230cfdefe0b68 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS850** | | | |
| LibXmu | 1.0.5 | libXmu-1.0.5.tar.bz2 | e7ff5960f2374852f941f909edbdeafe7df29322f |
| libXpm | 3.5.8 | libXpm-3.5.8.tar.bz2 | 3bfe833ed4527f74b1e66e386da62271d0313413 |
| libXrandr | 1.3.0 | libXrandr-1.3.0.tar.bz2 | 33dd2f670604165f872db9ea03f597e28517f0c8e |
| libXrender | 0.9.5 | libXrender-0.9.5.tar.bz2 | 278f762fdb8e754aa52141735abf5800f186281f7 |
| libXres | 1.0.4 | libXres-1.0.4.tar.bz2 | d5ea9560a61666e6bb3d2285b9634fced7211d65 |
| libXScrnSaver | 1.2.0 | libXScrnSaver-1.2.0.tar.bz2 | ea2935eb67efa77fd90372337f2d782a8ef74cea |
| libXt | 1.0.7 | libXt-1.0.7.tar.bz2 | 3c285b9c04a393dec1cc3d60cf5582d798eb3272 |
| libXtst | 1.1.0 | libXtst-1.1.0.tar.bz2 | 4363e9285bfb5a884073efacc50d39edb803a1a5 |
| libXv | 1.0.5 | libXv-1.0.5.tar.bz2 | 3936dd661e75d173b9fd1da9d97e5720e9657254 |
| libXvMC | 1.0.5 | libXvMC-1.0.5.tar.bz2 | 153b85884f22b882cecb9fc462fe24c669a80dbd |
| libXxf86dga | 1.1.1 | libXxf86dga-1.1.1.tar.bz2 | a93004cfbe4fd6bc37c6645705d5a6d90c0940b7 |
| libXxf86vm | 1.1.0 | libXxf86vm-1.1.0.tar.bz2 | f5ce7854f201d9c69dfcdd13123b51f497b69a47 |
| makedepend | 1.0.2 | makedepend-1.0.2.tar.bz2 | 57e092856580d9984e47e4b1433b69391de07df3 |
| mkfontdir | 1.0.5 | mkfontdir-1.0.5.tar.bz2 | 971728b0f453ea5df028aa5d54fe3fbdb8e99a7d |
| mkfontscale | 1.0.7 | mkfontscale-1.0.7.tar.bz2 | 0a0c25da68e87380e2e013c808a6e0cc0983fae9 |
| pango | 1.16.4 | pango-1.16.4.tar.bz2 | 6a21126632ed99950818c64d8598b6e92fa7da58 |
| pixman | 0.15.20 | pixman-0.15.20.tar.gz | a5f973b6895e269731964fbe328f61a8cbfdc931 |
| qt-x11-opensource-src | 4.5.0 | qt-x11-opensource-src-4.5.0.tar.gz | 503842349b644f1e6af6e6c735bec7174ebcd6245 |
| randrproto | 1.3.1 | randrproto-1.3.1.tar.bz2 | 36731bae6c815453af4b055c26ad8c9e2653ca05 |
| recordproto | 1.14 | recordproto-1.14.tar.bz2 | 2129285728986d150366c6026e2694b193ff9f79 |
| renderproto | 0.11 | renderproto-0.11.tar.bz2 | d30cf508b1a1b5f0deb1e6dbd4bb2f4e57680637 |
| resourceproto | 1.1.0 | resourceproto-1.1.0.tar.bz2 | 36b86840005c15c396c86d7075688d430ab2a11d |
| scrnsaverproto | 1.2.0 | scrnsaverproto-1.2.0.tar.bz2 | e234efc9a1ee57fd12957389dee90518fd7ea6b6 |
| sessreg | 1.0.5 | sessreg-1.0.5.tar.bz2 | d1dac6a398b23ed44bb67286cc083e9071bd00e7 |
| setxkbmap | 1.1.0 | setxkbmap-1.1.0.tar.bz2 | 02f93a08ac060df760566693c748e0fba3db8a06 |
| smproxy | 1.0.3 | smproxy-1.0.3.tar.bz2 | 1ba44afa58b05d6a6f7e1b1f67b793dcc2ccf2ba |
| splashy | 0.3.12 | splashy-0.3.12.tar.gz | 4c721222b20b8fd3fbb8e845ed5c0f05cccad68a |
| tiff | 3.8.2 | tiff-3.8.2.tar.gz | 549e67b6a15b42bfcd72fe17eda7c9a198a393eb |
| twm | 1.0.4 | twm-1.0.4.tar.bz2 | 7456e90f19e4747e1785f590b93f692d68a9f079 |
| util-macros | 1.5.0 | util-macros-1.5.0.tar.bz2 | ae61387be2a0b97f839041832bd8d06e03cfe942 |
| videoproto | 2.3.0 | videoproto-2.3.0.tar.bz2 | 4aef2b438d45b3ab75e6409966cc1267d3468f18c |
| x11perf | 1.5.1 | x11perf-1.5.1.tar.bz2 | d1f85da3df5b216b64c1735d109380214787222d |
| xauth | 1.0.4 | xauth-1.0.4.tar.bz2 | 90d32f28bb61ca6d831dcc35429a5ad53be73283 |
| xbacklight | 1.1.1 | xbacklight-1.1.1.tar.bz2 | 3541ab5e0956b4f0c97b1200dc32a35d2ccb0f0f |
| xbitmaps | 1.1.0 | xbitmaps-1.1.0.tar.bz2 | 845b825f7e6d193d47db8b67ae8332d87ef8c2b3 |
| xclock | 1.0.4 | xclock-1.0.4.tar.bz2 | 1987eafb3163c6b68bc7ecfbe143c8cd373d64bb |
| xcmiscproto | 1.2.0 | xcmiscproto-1.2.0.tar.bz2 | 1a55e042b33c0e0aaf2299942315a5208d644707 |
| xcmsdb | 1.0.2 | xcmsdb-1.0.2.tar.bz2 | 8341f7219a5720da758b0571eb1f4d9072265485 |
| xcursorgen | 1.0.3 | xcursorgen-1.0.3.tar.bz2 | 7df26b371476654dd191c45e7d20a3a5e0cad87 |
| xcursor-themes | 1.0.2 | xcursor-themes-1.0.2.tar.bz2 | 12b865c17c65e70a6bc20300dfa660fe8faaa0a4 |
| xdpyinfo | 1.1.0 | xdpyinfo-1.1.0.tar.bz2 | 01971f007048a46a4a31a69c661bc3a378de60f0 |
| xdriinfo | 1.0.3 | xdriinfo-1.0.3.tar.bz2 | d211d6f12f4c801d2f4cf184c6daae37aa5858ff |
| xev | 1.0.4 | xev-1.0.4.tar.bz2 | 4f62e131ba96842eef1660e8869583cd3923ac35 |

| Software Product | Software Version | Filename | SHA256 Hash Value |
|---|---|---|---|
| **DS850** | | | |
| Xcalproto | 7.1.1 | xcalproto-7.1.1.tar.bz2 | 1bb1bd12d65a17b3168de9b1e028b33a2f7b2cad |
| xf86bigfontproto | 1.2.0 | xf86bigfontproto-1.2.0.tar.bz2 | 512a2ca708b257520c1af4393b69d73a393a478f |
| xf86dgaproto | 2.1 | xf86dgaproto-2.1.tar.bz2 | 97a06120e7195c968875e8ba42e82c90ab54948b |
| xf86driproto | 2.1.0 | xf86driproto-2.1.0.tar.bz2 | 0dfc6616f7c68ca3c3b5cedb1e365aaa93be8548 |
| xf86-input-keyboard | 1.4.0 | xf86-input-keyboard-1.4.0.tar.bz2 | 5061fdaff8b7ddebcea82f065e1abbfff255a1da |
| xf86-input-mouse | 1.5.0 | xf86-input-mouse-1.5.0.tar.bz2 | b9213bf745b793a3da2c916ea4d8ee5768e560f1 |
| xf86-video-vesa | 2.3.0 | xf86-video-vesa-2.3.0.tar.bz2 | 4689b7c295d7a8d7326302dafecb812739617134 |
| xf86vidmodeproto | 2.3 | xf86vidmodeproto-2.3.tar.bz2 | 22d034c2f66985f8541b9ea3421096ceaa006355 |
| xgamma | 1.0.3 | xgamma-1.0.3.tar.bz2 | f9c7d93f1b271bab41ee3c91b371d52572e1e08c |
| xhost | 1.0.3 | xhost-1.0.3.tar.bz2 | ebcdccdc908e642e527eebbde6ba8084d90c04f6 |
| xineramaproto | 1.2 | xineramaproto-1.2.tar.bz2 | 3c397c9ea38aaae785dd7901f250891dfa7f3249 |
| xinit | 1.2.0 | xinit-1.2.0.tar.bz2 | 85a838c2010f27ef6d09d6ec4b1208a66cc8d697 |
| xinput | 1.5.0 | xinput-1.5.0.tar.bz2 | 02d1ecc83007aa7848b1b024ac64c310303f973e |
| xkbcomp | 1.1.1 | xkbcomp-1.1.1.tar.bz2 | aeb733c495d7afd42136bf8ae5c6e792c63f0b4b |
| xkbevd | 1.1.0 | xkbevd-1.1.0.tar.bz2 | b510b4a1b7486beacb5570c204f7fdd4b61f0ab4 |
| xkbutils | 1.0.2 | xkbutils-1.0.2.tar.bz2 | 2c025038ca12ee2494b2401ea2c12c74fe88bf91 |
| xkeyboard-config | 1.7 | xkeyboard-config-1.7.tar.bz2 | d6df43bfc0596be04865f2be7c4e794e198358c8 |
| xkill | 1.0.2 | xkill-1.0.2.tar.bz2 | 9070865285 9dbf71b682c3b9163ebf72ce88c4bc |
| xlsatoms | 1.0.2 | xlsatoms-1.0.2.tar.bz2 | 385573ab5ce0d43b5886ac0ffa58d7ef96f46926 |
| xlsclients | 1.0.2 | xlsclients-1.0.2.tar.bz2 | 5cde29a28c5352d1d555714826f57c05197e419d |
| XML-Parser | 2.36 | XML-Parser-2.36.tar.gz | 74aaaa4f939ebf788d8af5163cbc9802b1b04bfa |
| xmbdff | 0.6.2 | xmbdff-0.6.2.tar.gz | 4a540b067881c069d589eee40be79578effc7c9b |
| xmodmap | 1.0.4 | xmodmap-1.0.4.tar.bz2 | 9b49388bb527a8f7b7a86e4aa4c75a83372f6baa |
| xorg-server | 1.7.1 | xorg-server-1.7.1.tar.bz2 | d31e259b3ab975e2e1baca8f7310b57152ac3c62 |
| xpr | 1.0.3 | xpr-1.0.3.tar.bz2 | 9dbd0ff136b612285c00d92d0c7675a4207b1e4a |
| xprop | 1.1.0 | xprop-1.1.0.tar.bz2 | 16b377c76a4a01020006 3a058e7a5c244ab6ff00 |
| xproto | 7.0.16 | xproto-7.0.16.tar.bz2 | 0cda5588d42f2c810d8491da4fe84a1095e12bc |
| xrandr | 1.3.2 | xrandr-1.3.2.tar.bz2 | 0e49b0a0889ae8a590152c6cd0d60a2253a8d940 |
| xrdb | 1.0.6 | xrdb-1.0.6.tar.bz2 | e4faff5e02b3027298dc589e318a6dc7eb30a6d5 |
| xrefresh | 1.0.3 | xrefresh-1.0.3.tar.bz2 | 3f34ecca9509f47c60ddfc14a98225caffeba705 |
| xset | 1.1.0 | xset-1.1.0.tar.bz2 | ff1295f4282182609 2b172f8c1ad65e16cd860ef |
| xsetroot | 1.0.3 | xsetroot-1.0.3.tar.bz2 | 56ed1df9834627a107550475629df51275cd0c44 |
| xterm | 254 | xterm-254.tgz | 934811737745b76ca75bf940feb975943bf1084d |
| xtrans | 1.2.5 | xtrans-1.2.5.tar.bz2 | e8c4ce58b42d05e613fe535319a7d7f45f30f3e9 |
| xvinfo | 1.1.0 | xvinfo-1.1.0.tar.bz2 | 8695bfb597dbf5ed8e3277fddda4722da21baaa3 |
| xwd | 1.0.3 | xwd-1.0.3.tar.bz2 | f6708d14040630d1d3255987c28efcbf7aee05aa |
| xwininfo | 1.0.5 | xwininfo-1.0.5.tar.bz2 | 9730db0d1bd75b8bc5bc399f56cab9f5aee3bcfc |
| xwud | 1.0.2 | xwud-1.0.2.tar.bz2 | 15a6c5e3ffc03b7e8e59794 7061940fee6c0a9fc |
| **lfs_kernel-2.6.22.19-src.tar** | | | |
| linux kernel | 2.6.22.9 | linux-2.6.22.19.tar.bz2 | f807671 05a5bac3010562692cd53c8506814e9ff |

# Appendix E

## FL EVS 4.5.0.0 DS200 Test Report

wyle laboratories

Wyle Laboratories, Inc.
7800 Highway 20 West
Huntsville, Alabama 35806
Phone: (256) 837-4411 • Fax (256) 721-0144
www.wyle.com

REPORT NO.: T71013.01-01
WYLE JOB NO.: T71013.01
CLIENT P.O. NO.: ES&S-MSA-TA029
CONTRACT: N/A
TOTAL PAGES (INCLUDING COVER): 125
DATE: September 18, 2013

# TEST REPORT

**HARDWARE COMPLIANCE TESTING**
**OF THE**
**ELECTION SYSTEMS & SOFTWARE**
**FL EVS 4.5.0.0 VOTING SYSTEM**
**DS200 HARDWARE VERSION 1.3**

for

Election Systems & Software, LLC
11208 John Galt Boulevard
Omaha, NE 68137

STATE OF ALABAMA
COUNTY OF MADISON

Robert R. Bridges, Director, being duly sworn, deposes and says: The information contained in this report is the result of accurate and carefully conducted tests, and is to the best of my knowledge true and correct in all respects.

SUBSCRIBED and sworn to before me this 18 day of Sept 20 13

Natalie Vuce
Notary Public in and for the State of Alabama at Large.
My Commission expires 3/19/16

Wyle shall have no liability for damages of any kind to persons or property, including special or consequential damages, resulting from Wyle's operations, the services covered by this report.

PREPARED BY: 09/18/2013
Ryan D. Chambers, Project Engineer Date

APPROVED BY: 9/18/13
Frank Padilla, Testing Systems Manager Date

WYLE Q. A.: 9/18/13
Ruel Torrecer, Q. A. Manager Date

NVLAP
NVLAP Lab Code 200774-0

VSTL

wyle Laboratories

**Revisions**

REVISION Original Release
REPORT NO. T71013.01-01
DATE September 18, 2013

| REV | DATE | PAGE OR PARAGRAPH AFFECTED | DESCRIPTION OF CHANGES |
|---|---|---|---|
| — | 9-12-12 | Entire Document | Original Release |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

TABLE OF CONTENTS

Page No.

TABLE OF CONTENTS (continued)

# 1.0 INTRODUCTION

## 1.1 Scope

This report documents the test procedures followed and the results obtained from the Environmental and Electrical Testing performed on the Florida Election Voting System (FL EVS) 4.5.0.0 for Election Systems & Software (ES&S). Upon receipt by Wyle Laboratories, the systems were inspected and subjected to a Physical Configuration Audit (PCA). All testing was performed at Wyle Laboratories' Huntsville, Alabama, Test Facility.

## 1.2 Objective

The ES&S FL EVS 4.5.0.0 Voting System was tested in reference to the United States Federal Election Commission (FEC) 2002 Voting System Standards (VSS) and all applicable EAC 2005 Voluntary Voting Systems Guidelines (VVSG).

## 1.3. Test Report Overview

This test report consists of four main sections and attachments:

- 1.0 Introduction – Provides the architecture of the National Certification Test Report (hereafter referred to as Test Report); a brief overview of the testing scope of the Test Report; a list of documentation, customer information, and references applicable to the voting system hardware, software, and this test report.
- 2.0 System Identification and Overview – Provides information about the equipment tested.
- 3.0 Test Background – Contains information about the certification test process and a list of terms and nomenclature pertinent to the Test Report and system tested.
- 4.0 Test Procedures and Results – Provides a summary of the results of the testing process.
- Attachments – Information supporting reviews and testing of the voting system are included as attachments to this report.

## 1.4 Customer

Election Systems & Software, LLC
11208 John Galt Boulevard
Omaha, NE 68137

(The remainder of this page intentionally left blank)

1.0 INTRODUCTION (Continued)

1.5 References

The documents listed were utilized to perform certification testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines," and Volume II, Version 1.0, "National Certification Testing Guidelines," dated December 2005
- United States Federal Election Commission Voting System Standards Volume I, "Performance Standards" and Volume II, "Test Standards" dated April 2002
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 1.0, effective date July 2008
- Florida Voting System Standards, Form DS-DE 101, 1-12-05
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)," dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)," dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Wyle Laboratories' Test Guidelines Documents: EMI-001A, "Wyle Laboratories' Test Guidelines for Performing Electromagnetic Interference (EMI) Testing," and EMI-002A, "Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products"
- Wyle Laboratories' Quality Assurance Program Manual, Revision 5
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- EAC Requests for Interpretation (listed on www.eac.gov)
- EAC Notices of Clarification (listed on www.eac.gov)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW

### 2.1 System Overview

The ES&S FL EVS 4.5.0.0 Voting System is a new system that contains a newly configured DS200 hardware version 1.3. The new DS200 tabulator configuration consists of a new mother board, scanner board, redesigned transport path, and a removable battery access panel. Based on the upgrades and modifications to the DS200 a full hardware testing suite was performed at Wyle. For the ES&S FL EVS 4.5.0.0 Voting System, Wyle subjected the DS200 to: non-operating environmental tests, operating environmental tests and Electromagnetic Compatibility (EMC) tests. The ElectionWare EMS was only utilized to generate election media and verify results. Wyle only documented the configuration used during testing conducted at Wyle.

### 2.2 System Identification

The materials required for testing of the ES&S FL EVS 4.5.0.0 Voting System included software, hardware, test materials, and deliverable materials shipped directly to Wyle by ES&S. The materials documented in the following sections are the materials used during Wyle's testing of only the DS200 and the interface with the EMS.

#### 2.2.1 Hardware

This subsection categorizes the equipment the manufacturer submitted for testing and is listed in Table 2-1. Each test element is included in the list of the equipment required for testing of that element, including system hardware, general purpose data processing and communications equipment, and any required test instrumentation.

**Table 2-1 ES&S FL EVS 4.5.0.0 Test Equipment**

| Equipment | Description | Serial Numbers |
|---|---|---|
| DS200<br>(Hardware Revision 1.3) | Precinct Count Digital Scanner | DS03133500006 (ENV)<br>DS03133500010 (ENV)<br>DS03133500009 (EMI) |
| Ballot Box | Plastic Ballot Box/Plastic Transport Case | T71013-BB-002 |
| Ballot Box | Hard Vinyl Transport Case | T71013-BB-003 |
| Ballot Box | Metal Box with Electromechanical Diverter | T71013-BB-001 |
| Dell Latitude Laptop | CPU: Intel Core i5-2540M 2.60Ghz<br>RAM: 4.00 GB<br>HDD: 250GB – ST250LT007-9ZV14C<br>OS: Windows 7 Professional SP1 – 64 bit | 39CMDS1 |
| Transport Media/<br>Memory Device/<br>USB Flash Drive | Approved Manufacturer List:<br>Kingston<br>SanDisk<br>Delkin<br>Approved Capacity List:<br>512 MB<br>1 GB<br>2 GB<br>4 GB<br>8GB | Wyle-assigned: TM-XXX* |
| Compact Flash Card/<br>CF Card | Approved Manufacturer List:<br>Delkin<br>Approved Capacity List:<br>1 GB | Wyle-assigned: CF-XXX* |

*Wyle uniquely labels each media device with the information (election, results, test utilized for) loaded on the device.

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.2 System Identification (Continued)

#### 2.2.2 Software

The software evaluated was limited to ElectionWare, Election Reporting Manager (ERM), and the firmware build for the DS200. Only the changes incorporated since the EVS 5.0.0.0 test campaign were evaluated by Wyle. Wyle utilized an EMS setup with new versions of ElectionWare and ERM to load election information onto transport media. Wyle did not test the EMS for any other functionality.

**Table 2-2 Software Required for Testing**

| Software Identification | Version |
|---|---|
| DS200 Firmware | 2.11.0.01 |
| DS200 Scanner Board Firmware | 3.0.0.0b |
| DS200 Power Management Board | 1.2.10.0a |

### 2.3 Test Support Materials

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

The following test materials were required to support the ES&S FL EVS 4.5.0.0 test campaign:

**Table 2-3 Test Support Equipment**

| Test Material | Quantity |
|---|---|
| Paper Rolls | 25 rolls total |
| Pre Printed Ballots | 1,200 total (14" size) |

### 2.4 Vendor Technical Data Package

The Technical Data Package (TDP) contains information about requirements, design, configuration management, quality assurance, and system operations. A sealed version of the TDP was submitted for this campaign due to only Hardware Testing being performed. The table below provides the TDP documents submitted and reviewed for the ES&S FL EVS 4.5.0.0 campaign.

**Table 2-5 ES&S FL EVS 4.5.0.0 Voting System TDP**

| ES&S FL EVS 4.5.0.0 TDP Documents | Version | Doc No. | Document Code |
|---|---|---|---|
| *System Hardware Specification* | | | |
| System Hardware Specification – DS200 | 1.0 | 03-01 | DS200HW_M_SPC_0313_HWSpec |
| *System Test/Verification Specification* | | | |
| System Operations Procedures – DS200 | 1.0 | 07-06 | FLEVS4500_SOP_DS200 |
| *System Maintenance Manuals* | | | |
| System Maintenance Manual – DS200 | 1.0 | 08-01 | FLEVS4500_SMM_DS200 |

## 3.0 TEST BACKGROUND

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

- ISO-9001:2000
- NVLAP Accredited ISO 17025:2005
- EAC Accredited VSTL, NIST 150,150-22
- A2LA Accredited (Certification No.'s 845.01, 845.02, and 845.03)
- FCC Approved Contractor Test Site (Part 15, 18, 68)

### 3.1 General Information about the Test Process

All testing performed as part of the test effort was performed at the Wyle Labs Huntsville, AL facility. Conformance testing was limited to the ES&S FL EVS 4.5.0.0 Voting System component previously identified in this report.

All hardware used during testing for this test campaign was configured "As Used" for voting. Each tabulator was placed on a ballot box and loaded with the proper firmware. The ES&S FL EVS 4.5.0.0 EMS suite was loaded on a COTS PC. All media used during testing was loaded from this EMS PC. All hardware used to build the DS200 firmware was configured by Wyle.

### 3.2 Wyle Quality Assurance

All work performed on this program was in accordance with Wyle Laboratories' Quality Assurance Program and Wyle Laboratories' Quality Program Manual, which conforms to the applicable portions of International Standard Organization (ISO) Guide 17025.

The Wyle Laboratories, Huntsville Facility, Quality Management System is registered in compliance with the ISO-9001 International Quality Standard. Registration has been completed by Quality Management Institute (QMI), a Division of Canadian Standards Association (CSA).

### 3.3 Test Equipment and Instrumentation

All instrumentation, measuring, and test equipment used in the performance of this test program was calibrated in accordance with Wyle Laboratories' Quality Assurance Program, which complies with the requirements of ANSI/NCSL Z540-1, ISO 10012-1, and ISO/IEC 17025. 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.

(The remainder of this page intentionally left blank)

## 3.0 TEST BACKGROUND (Continued)

### 3.4 Terms and Abbreviations

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

**Table 3-1 Terms and Abbreviations**

| Term | Abbreviation | Definition |
|---|---|---|
| Americans with Disabilities Act of 1990 | ADA | ADA is a wide ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability. |
| Configuration Management | CM | --- |
| Commercial Off the Shelf | COTS | Commercial, readily available hardware or software |
| Direct Record Electronic | DRE | --- |
| United States Election Assistance Commission | EAC | Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems. |
| Election Management System | EMS | |
| Equipment Under Test | EUT | --- |
| Help America Vote Act | HAVA | Act created by United States Congress in 2002 |
| National Institute of Standards and Technology | NIST | Government organization created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhances economic security and improves our quality of life. |
| Physical Configuration Audit | PCA | Review by accredited test laboratory to compare voting system components submitted for certification testing to the manufacturer's technical documentation and confirmation the documentation meets national certification requirements. A witnessed build of the executable system is performed to ensure the certified release is built from tested components. |
| Quality Assurance | QA | --- |
| Technical Data Package | TDP | Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing. |
| Voting System Standards | VSS | Published by the FEC, second iteration of national level voting system standards. |
| Voluntary Voting System Guidelines | 2005 VVSG | Published by the EAC, the third iteration of national level voting system standards. |
| Wyle Operating Procedure | WOP | Wyle Test Method or Test Procedure |

## 4.0 TEST FINDINGS AND RECOMMENDATIONS

The ES&S FL EVS 4.5.0.0 Voting System component, as listed in Section 2.0, were subjected to the tests described in Section 3.2 of this report. The results of those tests are summarized in the sections below. All hard copy data generated by the performance of these tests is retained by Wyle as raw data.

### 4.1 System Level Baseline

A System Level Baseline was performed to evaluate the system being submitted for testing in comparison to the system TDP. A Physical Configuration Audit was performed on the ES&S FL EVS 4.5.0.0 submitted for Hardware Testing.

#### 4.1.1 Physical Configuration Audit

A focused Physical Configuration Audit (PCA) of the ES&S FL EVS 4.5.0.0 Voting System was performed in accordance with Section 6.6 of Volume II of the 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 purpose of the PCA is to: establish a configuration baseline (both hardware and software) of the system to be tested; verify that the reviewed source code conforms to the vendor's specification; and assess the adequacy of user acceptance test procedures and data.

The PCA performed on the ES&S FL EVS 4.5.0.0 Voting System consisted of inspecting the DS200 scanner, firmware/software, and the TDP used in the ES&S FL EVS 4.5.0.0 Voting System.

**Summary Findings:** A focused PCA was performed to baseline the system's hardware and software components prior to commencement of the test campaign. No discrepancies were noted during the PCA.

### 4.2 Technical Data Package Review

The ES&S FL EVS 4.5.0.0 Voting System Technical Data Package (TDP) was not reviewed to the 2005 VVSG. The supplied TDP documents were only utilized as reference material for EUT configuration and test set-up.

**Summary Findings:** TDP was not performed.

### 4.3 Hardware Testing

Hardware testing included: the inspection and evaluation of voting system documentation; tests of voting system under conditions simulating the intended storage, operation, and transportation; and operational tests verifying system performance and function under normal and abnormal conditions. Hardware testing was limited to the ES&S FL EVS 4.5.0.0 Voting System. Hardware Testing Data can be located in Attachments A - G of this document for additional information

The DS200 was subjected to hardware tests as summarized in Table 4-1.

**Table 4-1 Test Program Requirements**

| REPORT SECTION | VVSG VOL. I SECTION | VVSG VOL. II SECTION | TEST DESCRIPTION |
|---|---|---|---|
| 4.5.1 | N/A | 4.6.4 | Low Temperature Test |
| 4.5.1 | N/A | 4.6.5 | High Temperature Test |
| 4.5.1 | N/A | 4.6.3 | Vibration Test |

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.3 Hardware Testing (Continued)

Table 4-1 Test Program Requirements (Continued)

| REPORT SECTION | VVSG VOL. I SECTION | VVSG VOL. II SECTION | TEST DESCRIPTION |
|---|---|---|---|
| 4.5.1 | N/A | 4.6.2 | Bench Handling Test |
| 4.5.1 | N/A | 4.6.6 | Humidity Test |
| 4.5.2 | N/A | 4.7.1 | Temperature/Power Variation Test |
| 4.6.1 | 4.1.2.5 | 4.8A | Electrical Power Disturbance Test |
| 4.6.2 | 4.1.2.9 | 4.8B | Electromagnetic Radiation Test |
| 4.6.3 | 4.1.2.8 | 4.8C | Electrostatic Disruption Test |
| 4.6.4 | 4.1.2.10 | 4.8D | Electromagnetic Susceptibility Test |
| 4.6.5 | 4.1.2.6 (a) | 4.8E | Electrical Fast Transient Test |
| 4.6.6 | 4.1.2.7 (a) (b) | 4.8F | Lightning Surge Test |
| 4.6.7 | 4.1.2.11 (a) | 4.8G | Conducted RF Immunity Test |
| 4.6.8 | 4.1.2.12 | 4.8H | Magnetic Fields Immunity Test |
| 4.6.9 | 4.3.8 | N/A | Product Safety Review, UL60950-1 |

4.4 Environmental Tests

Environmental tests were performed to ensure that the EUT and associated machine resident firmware were in compliance with the VVSG.

During test performance, the EUT was configured as it would be for use in an election precinct.

4.4.1 Non-Operating Environmental Tests

The EUT was subjected to various Non-Operating Environmental Tests. Prior to and immediately following each test environment, the EUT was powered on and subjected to operability functional checks to verify continued proper operation. The EUT was not powered on during the performance of any of the non-operating tests.

Low Temperature Test

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

Prior to test initiation, the EUT was subjected to a baseline operability checkout to verify system readiness. The EUT was then placed in an environmental test chamber and the chamber temperature was lowered to -4°F and allowed to stabilize. Upon temperature stabilization, the temperature was maintained for an additional four hours. The temperature was then returned to standard laboratory ambient conditions at a rate not exceeding 10°F per minute.

During the Low Temperature Test there was one anomaly encountered (reference Notice of Anomaly No. 7 in Attachment A for further reference). This anomaly required testing to be repeated.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4.1 Non-Operating Environmental Tests (Continued)

Upon completion of the second attempt the EUT was removed from the chamber and inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was successfully subjected to a post test operability checkout.

The EUT successfully completed the requirements of the Low Temperature Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

**High Temperature Test**

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

Prior to test initiation, the EUT was subjected to a baseline operability checkout to verify system readiness. The EUT was then placed in an environmental test chamber and the chamber temperature was raised to 140°F and allowed to stabilize. Upon temperature stabilization, the temperature was maintained for an additional four hours. The temperature was then returned to standard laboratory ambient conditions at a rate not exceeding 10°F per minute.

The EUT was removed from the chamber and inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was successfully subjected to a post-test operability checkout.

The EUT successfully completed the requirements of the High Temperature Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

**Vibration Test**

The EUT was subjected to a Vibration Test in accordance with section 4.6.3 of Volume II of the VVSG. The purpose of this test is to simulate stresses faced during transport of voting machines and ballot counters between storage locations and polling places. This test is equivalent to the procedure of MIL- STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier.

Prior to test initiation, the EUT was subjected to a baseline operability checkout to verify system readiness. Upon completion, the EUT was secured to an electro dynamics shaker. One control accelerometer was affixed to the shaker table. The EUT was subjected to the Basic Transportation, Common Carrier profile as depicted in Mil-Std-810D, Method 514.3, Category 1, with a frequency range from 10 to 500 Hz and an overall rms level of 1.04, 0.74, and 0.20 G for durations of 30 minutes in each orthogonal axis.

The DS200 successfully completed the requirements of the Vibration Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 Environmental Tests (Continued)

4.4.1 Non-Operating Environmental Tests (Continued)

Bench Handling Test

The EUT was subjected to a Bench Handling Test in accordance with section 4.6.2 of Volume II of the VVSG. The purpose of this test is to simulate stresses faced during maintenance and repair of voting machines and ballot counters. This test is equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI.

Prior to performance of the test, the EUT was subjected to a baseline operability checkout. Following the checkout, each edge of the base of the machine 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.

Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT successfully completed the requirements of the Bench Handling Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

Humidity Test

The EUT was subjected to a Humidity Test in accordance with section 4.6.6 of Volume II of the VVSG. The purpose of the test was to simulate stresses encountered during storage of voting machines and ballot counters. This test is similar to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid.

The EUT was subjected to a baseline operability checkout to verify system readiness. Upon completion, the EUT was placed in an environmental test chamber and was subjected to a 10-day humidity cycle in accordance with the 24-hour cycle values as shown in Table 4-2.

Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. The DS200 successfully completed the requirements of the Humidity Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

Table 4-2 Humidity Test Cycle Values

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

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 Environmental Tests

4.4.2 Operating Environmental Tests

**Temperature/Power Variation Test**

The DS200 was subjected to a Temperature and Power Variation Test in accordance with section 4.7.1 of Volume II of the VVSG. The purpose of this test was to evaluate system operation under various environmental conditions. The cumulative duration of at least 163 hours was achieved by utilizing three units for a period of 64 hours based on the (EAC RFI 2008-01), with 48 hours in the environmental test chamber. For the remaining hours, the equipment was operated at room temperature. This test is similar to the low temperature and high temperature tests of MIL-STD-810-D, Method 502.2 and Method 501.2.

To perform the test, the EUTs were placed inside an environmental walk-in test chamber and connected to a variable voltage power source. The temperature inside the chamber and the voltage supplied to the hardware varied from 50°F to 95°F and from 105 VAC to 129 VAC (as depicted in Figures 4-1 through 4-4). During test performance, the operational functions were continuously exercised by the scanning of ballots. A minimum of 100 ballots per hour were scanned.

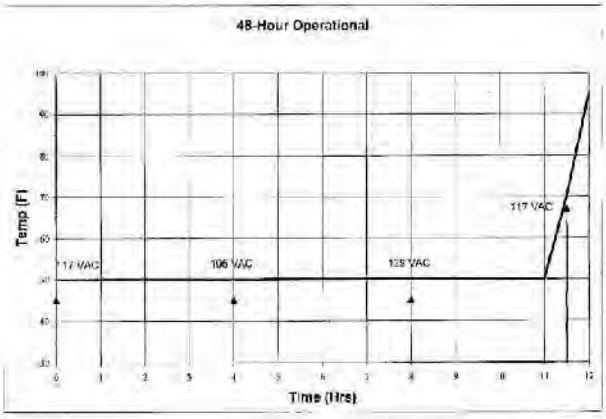



Figure 4-1 Temperature/Power Variation Profile Hours 0-12

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4.2 Operating Environmental Tests (Continued)

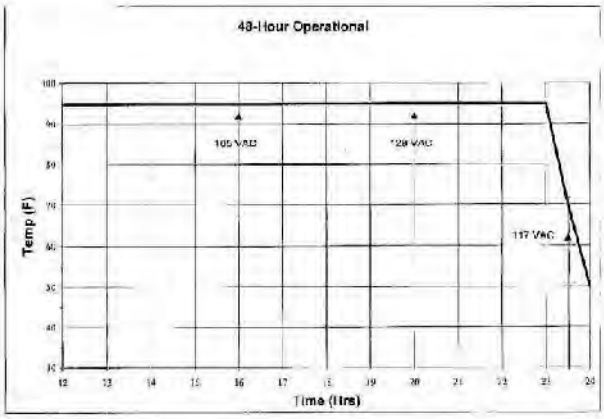



Figure 4-2 Temperature/Power Variation Profile Hours 12-24

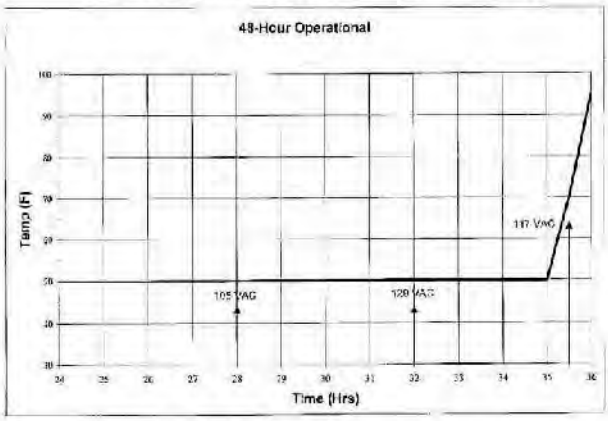



Figure 4-3 Temperature/Power Variation Profile Hours 24-36

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4.2 Operating Environmental Tests (Continued)

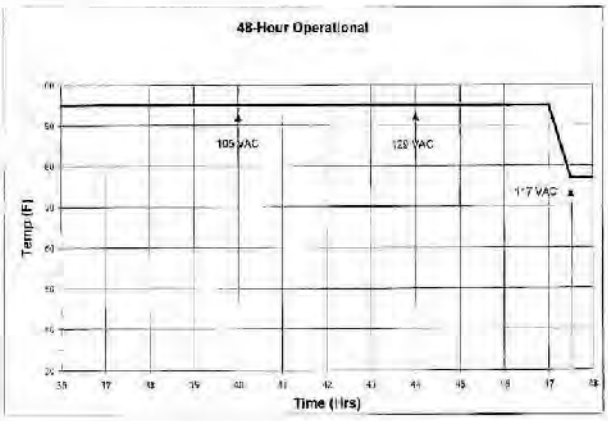



Figure 4-4 Temperature/Power Variation Profile Hours 36-48

Summary Findings

The DS200 successfully completed the requirements of the Temperature/Power Variation Test on the first attempt without issue.

4.5 Electrical Tests

Electrical tests were performed to ensure that the EUT and associated machine resident firmware were in compliance with the VVSG.

During test performance, the EUT was configured as it would be for use in an election precinct.

The EUT was subjected to various electrical tests to ensure continued system operation and reliability in the presence of abnormal electrical events. The EUT was powered and actively counting ballots during all electrical tests. Prior to and immediately following each electrical test, an operational status check was performed. The Test Data Sheets, Photographs, and Instrumentation Equipment Sheets are contained in Attachments B, D, and G of this report.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5.1 Electrical Power Disturbance

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

The EUT was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing, and subjected to the voltage dips and surges over periods ranging from 20ms to four hours.

The EUT successfully met the requirements of the Electrical Power Disturbance Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.2 Electromagnetic Radiation Test (FCC Part 15 Emissions)

Electromagnetic Radiation emissions measurements were performed in accordance with sections 4.1.2.9 of Volume I and 4.8 of Volume II of the VVSG. This testing was performed to ensure that emissions emanating from the unit do not exceed the limits of 47 CFR Part 15, Subpart B, Class B Limits.

The EUT was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing. The DS200 was subjected to the test requirements detailed in Table 4-3

Table 4-3 Conducted and Radiated Emissions Requirements

| Conducted Emissions | | | Radiated Emissions | |
|---|---|---|---|---|
| Frequency Range (MHz) | Limits (dBµV) | | Frequency Range (MHz) | 3 Meter Test Limit (dBµV) |
| | Quasi-peak | 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 |

Testing was performed at the Wyle Laboratories' Open Air Test Site 2 (OATS-2) located on the Intergraph Complex in Huntsville, AL. The OATS-2 is fully described in reports provided to the Federal Communication Commission (FCC) (FCC Reference 98597). The site was tested and complies with the requirements of ANSI C63.4-2003.

To perform the Conducted Emissions portion of the test, the DS200 was set up as depicted in Figure 4-5.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5.2 Electromagnetic Radiation Test (FCC Part 15 Emissions) (Continued)

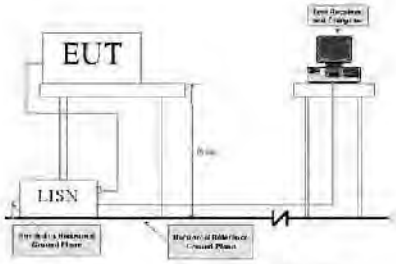



Figure 4-5 Conducted Emissions Test Setup

The DS200 was then subjected to the following test procedure:

1. The DS200 was placed on a non-metallic table 0.8 meters above the turntable and reference ground plane at the Open-Area Test Site.
2. The DS200 AC/DC Power Adapter was connected to the power mains through a Line Impedance Stabilization Network (L.I.S.N.). Other support units were connected to the power mains through another L.I.S.N. The L.I.S.Ns provided 50 ohm/50 µH of coupling impedance for the measuring instrument.
3. The DS200 was placed in an active state and monitored for functionality throughout testing.
4. Both Line and Neutral of the power mains connected to the DS200 were checked for maximum conducted interference.
5. The frequency range from 150 kHz to 30 MHz was evaluated and recorded. Emissions levels below – 20 dB were not recorded.

To perform the Radiated Emissions portion of the test, the DS200 was set up as depicted in Figure 4-6.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5.2 Electromagnetic Radiation Test (FCC Part 15 Emissions) (Continued)

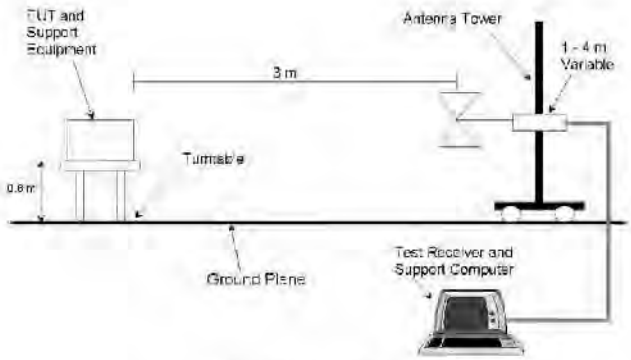



Figure 4-6 Radiated Emissions Test Setup

The DS200 was then subjected to the following test procedure:

1. The DS200 was placed on a non-metallic turn-table 0.8 meters above the reference ground plane at the Open-Area Test Site.

2. The DS200 was placed 3 meters away from the interference-receiving antenna, which was mounted on a variable-height antenna tower. The interference-receiving antenna used was a broadband antenna.

3. For each suspected emissions point, the DS200 was arranged in a worst case configuration. The table was rotated from 0 to 360 degrees and the antenna height was varied from one (1) to four (4) meters to identify the maximum reading.

4. All emissions points identified within 20 dB of the specified limit were tested individually using the quasi-peak method as specified and then reported in the tabular data.

The EUT was found to comply with the required emissions limits. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.3 Electrostatic Disruption

Electrostatic Disruption testing was performed in accordance with sections 4.1.2.8 of Volume I and 4.8 of Volume II of the VVSG to ensure that should an electrostatic discharge event occur during equipment setup and/or ballot counting, that the EUT would continue to operate normally. A momentary interruption is allowed so long as normal operation is resumed without human intervention or loss of data.

The EUT was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing without operator intervention. The EUT was then subjected to electrostatic discharges of +/- 8 kV contact and +/- 15 kV air as shown in Table 4-4. Discharges were performed at areas typical of those which might be touched during normal operation, including the touch screen, user buttons, and other likely points of contact. The DS200 was then setup per the following conditions:

1. Power lines and power line returns were configured as required by the system configuration.
2. The EUT was raised approximately 10 cm from the ground using isolated stand-offs.
3. Signal/control test cables were positioned approximately 5 cm (2 in.) above the ground.

**Table 4-4 Electrostatic Discharge Transients**

| | Requirements | | |
|---|---|---|---|
| Characteristic | Capacitance | Resistance | Value |
| Pulse Wave Shape (RC Network) | 150 | 330 | pF / Ω |
| Test Levels | Discharge Types | | Value |
| | Air Gap | Direct Contact | |
| | ±15 | ±8 | KV |
| Rise Time | ≤1 | | nanosecond |
| Pulse Decay Time | ≈30 at 50% height | | nanosecond |
| Pulse Repetition | ≥1 | | per second |
| Total Injected Pulse at each Test Point | 10 | | per polarity (±) |
| Temperature | ≥15 to ≤35 | | °C |
| Relative Humidity | ≥30 to ≤60 | | % |

During the ESD Test there was one anomaly encountered (reference Notice of Anomaly No. 8 in Attachment A for further reference).

During the second attempt the EUT successfully met the requirements of the ESD Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.4 Electromagnetic Susceptibility

Electromagnetic Susceptibility testing was performed in accordance with sections 4.1.2.10 of Volume I and 4.8 of Volume II 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 EUT was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing without operator intervention. The DS200 was then subjected to ambient electromagnetic fields at 10 V/m over a range of 80 MHz to 1000 MHz, as shown in Figure 4-7. 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.

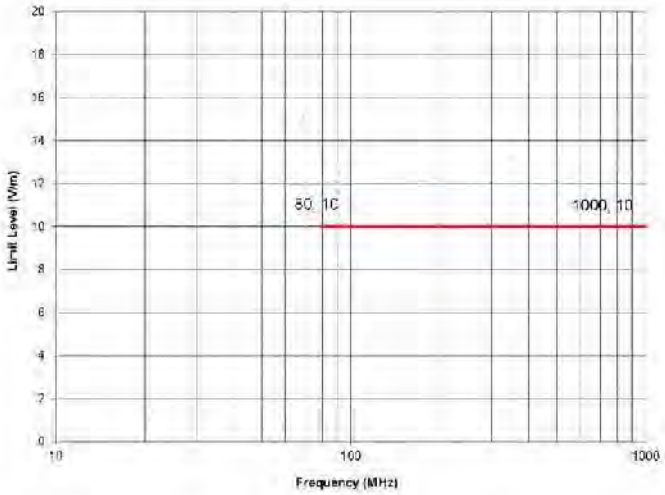



Figure 4-7 Radiated Susceptibility Limit

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.4 Electromagnetic Susceptibility

During the Susceptibility Test there were three anomalies encountered (reference Notice of Anomaly Nos. 4, 5 and 6 in Attachment A). During the fourth attempt there was no loss of normal operation or loss of data as a result of the applied electromagnetic fields.

On the fourth attempt the EUT successfully met the requirements of the Electromagnetic Susceptibility Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.5 Electrical Fast Transients

Electrical Fast Transients (EFT) testing was performed in accordance with sections 4.1.2.6 (a) of Volume I and 4.8 of Volume II of the 2005 VVSG 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 of loss of data. Section 4.1.2.6 (b) of Volume I is not applicable because there are no I/O lines greater than three meters.

The EUT was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing without operator intervention. The EUT was then subjected to electrostatic fast transients of 2 kV applied to its AC power lines. The pulse characteristics are listed in Table 4-5.

Table 4-5 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 | N/A |
| Burst Duration | 15 | milliseconds |
| Burst Period | 300 | milliseconds |
| Test Duration | 60 | seconds |

There was no loss of normal operation or loss of data as a result of the applied transients. The EUT successfully met the requirements of the Electrical Fast Transients Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.6 Lightning Surge

Lightning Surge testing was performed in accordance with sections 4.1.2.7 (a), (b) of Volume I and 4.8 of Volume II of the 2005 VVSG to ensure that, should a surge event occur on a power line due to a lightning strike, the EUT will continue to operate without disruption of normal operation or loss of data. Sections 4.1.2.7 (c), (d), and (e) are not applicable because there are no DC lines greater than 10 meters and no I/O lines greater than 30 meters.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.6 Lightning Surge (Continued)

The EUT was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing. The EUT power input lines were then subjected to lightning surge testing at a level of 2 kV applied to its AC power line per the surge characteristics listed in Table 4-6.

Table 4-6 Surge Characteristics

| Test I.D. | Cable Type | Number of Interfacing Cables | Description | Injection Signals Summary Characteristics |
|---|---|---|---|---|
| Surge | Line (L) to Neutral (N) | 1 | 120 VAC Power Lines | Injection at Power Input Sinewave: 0°, 90°, and 270° Combination Wave Test Levels: ±2.0 kV and Ring Wave Test Level = ±2.0 kV |
| | Line (L) to Ground (G) | 1 | | |
| | Neutral (N) to Ground (G) | 1 | | |
| | Line (L) & Neutral (N) to Ground (G) | 1 | | |

During the Lightning Surge Test there were two anomalies encountered (reference Notice of Anomaly Nos. 1 and 2 in Attachment A).

During the third attempt the EUT successfully met the requirements of the Lightning Surge Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.7 Conducted RF Immunity

Conducted RF Immunity testing was performed in accordance with sections 4.1.2.11 (a) of Volume I and 4.8 of Volume II of the 2005 VVSG. Section 4.1.2.11 (b) of Volume I is not applicable because there are no 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.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.7 Conducted RF Immunity

The EUT was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing without operator intervention. The EUT was then subjected to conducted RF energy of 10 V rms applied to its power lines over a frequency range of 150 kHz to 80 MHz.

There was no loss of normal operation or loss of data as a result of the applied conducted RF energy. The EUT successfully met the requirements of the Conducted RF Immunity Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.8 Magnetic Fields Immunity

Magnetic Fields Immunity testing was performed in accordance with sections 4.1.2.12 of Volume I and 4.8 of Volume II of the 2005 VVSG. This testing was performed to ensure that the EUT was able to withstand AC magnetic fields without disruption of normal operation of loss of data.

The EUT was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing. The EUT was then subjected to AC magnetic fields of 30 A/m at a 60 Hz power line frequency.

There was no loss of normal operation or loss of data as a result of the applied magnetic field.

The EUT successfully met the requirements of the Magnetic Fields Immunity Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.9 Product Safety Review

The VVSG states that all voting systems shall meet the following requirements for safety:

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

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

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

To satisfy these requirements, the voting system was subjected to a Product Safety Review in accordance with UL 60950-1, "Safety of Information Technology Equipment".

Attachment F of this report contains the Product Safety Certificate of Conformance.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.6 Anomalies and Resolutions

Eight Notices of Anomalies were issued during the test campaign. A Notice of Anomaly (NOA) is generated upon occurrence of a verified failure, an unexpected test result, or any significant unsatisfactory condition. The Notices of Anomaly generated during testing are presented in their entirety in ATTACHMENT A and are summarized below.

Notice of Anomaly No. 1: Lightning Surge Test

After being subjected to the Lightning Surge Test, the AC Power Adapter ceased to function. As a result, the FL EVS 4500 system did not successfully pass the Lighting Surge Test.

Resolution to Notice of Anomaly No. 1
ES&S acknowledged the nonconformance observation and resubmitted a replacement AC Power Adapter for testing as part of the DS200.

Notice of Anomaly No. 2: Lightning Surge Test

After being subjected to the Lightning Surge Test, the AC Power Adapter ceased to function. As a result, the FL EVS 4500 system did not successfully pass the Lighting Surge Test.

Resolution to Notice of Anomaly No. 2
ES&S modified the FL EVS 4500 system to include an in-line COTS surge suppressor and resubmitted a replacement AC Power Adapter for testing as part of the DS200.

Notice of Anomaly No. 4: Electromagnetic Susceptibility Test

After being subjected to the Electromagnetic Susceptibility Test, the DS200 suffered disruption of normal operation. As a result, the FL EVS 4500 system did not successfully pass the Electromagnetic Susceptibility Test.

Resolution to Notice of Anomaly No. 4
ES&S acknowledged the nonconformance observation and provided a root cause analysis.

Notice of Anomaly No. 5: Electromagnetic Susceptibility Review

After being subjected to the Electromagnetic Susceptibility Test, the DS200 suffered disruption of normal operation. As a result, the FL EVS 4500 system did not successfully pass the Electromagnetic Susceptibility Test.

Resolution to Notice of Anomaly No. 5
ES&S acknowledged the nonconformance observation and provided a root cause analysis.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.6 Anomalies and Resolutions (Continued)

Notice of Anomaly No. 6: Electromagnetic Susceptibility Review

After being subjected to the Electromagnetic Susceptibility Test, the DS200 suffered disruption of normal operation. As a result, the FL EVS 4500 system did not successfully pass the Electromagnetic Susceptibility Test.

Resolution to Notice of Anomaly No. 6
ES&S acknowledged the nonconformance observation and provided a root cause analysis.

Notice of Anomaly No. 7: Low Temperature Test

After being subjected to the Low Temperature Test, the DS200 was damaged due to human error during testing. As a result, the FL EVS 4500 system did not successfully pass the Low Temperature Test.

Resolution to Notice of Anomaly No. 7
Wyle counseled and retrained all technicians on the associated Wyle Operating Procedure and performed the test correctly, at which time the DS200 successfully completed the Low Temperature Test.

Notice of Anomaly No. 8: Electrostatic Disruption Test (ESD)

After being subjected to the Electrostatic Disruption, the DS200 ceased to function and required human intervention in the form of a power cycle, during testing. As a result, the FL EVS 4500 system did not successfully pass the Electrostatic Disruption.

Resolution to Notice of Anomaly No. 8
ES&S acknowledged the nonconformance observation; Wyle performed the Electrostatic Disruption Test a second time and the EUT successfully passed.

4.7 Test Summary and Conclusion

Wyle performed conformance testing on all modifications submitted for the ES&S FL EVS 4.5.0.0 Voting System. Wyle only tested the DS200 for the modifications. Modifications of the DS200 met all applicable requirements in the EAC 2005 VVSG.

**This report is valid only for the system identified in Section 2 of this report. Any changes, revisions, or corrections made to the system after this evaluation shall be submitted to Wyle to determine the scope of testing for the modified system. The scope of testing required will be determined based upon the degree of modification.**

ATTACHMENT A

NOTICES OF ANOMALY

wyle laboratories

NOTICE OF ANOMALY

DATE: 07/11/2013

NOTICE NO: 1 P.O. NUMBER: ES&S-MSA-TA029 CONTRACT NO: N/A
CUSTOMER: ES&S WYLE JOB NO: T71013.01
NOTIFICATION MADE TO: Paul Huffman NOTIFICATION DATE: 07/11/2013
NOTIFICATION MADE BY: Ryan Chambers VIA: In person

CATEGORY: [X] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: 07/11/2013
PART NAME: DS200 PART NO. DS200
TEST: Lightning Surge Test (LST) I.D. NO. D20131333C009
SPECIFICATION: VVSG Volume I
PARA. NO. Section 4.1.2.7

**REQUIREMENTS: 2005 VVSG Volume I: Section 4.1.2.4**

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, surges of:

a. ±2 kV AC line to line
b. ±2 kV AC line to earth
*c. ± or – 0.5 kV DC line to line >10m
*d. ± or – 0.5 kV DC line to earth >10m
e. ±1 kV I/O sig./control >30m

*Indicates requirements that do not apply to the Unit Under Test (UUT), due to the fact that UUT does not contain DC lines in excess of 10 Meters, nor does it contain any I/O lines greater than 30 meters.

**DESCRIPTION OF ANOMALY:**

After the being subjected to the Lightning Surge Test (LST) being performed on July 11, 2013 the AC Power Adapter ceased to function and as a result, the DS200 suffered a disruption of normal operation. The AC Power Adapter ceased to function, during application of 2 kV, The failure occurred at pulse 3 of 7 Sync: 0°/60Hz between the Path L1–N. Photographs were taken of the testing site.

Component Description: AC Power Adapter
Manufacturer: Power-Win Technology Corp.
Model: PW-080A2-1Y24A3

(The remainder of this page intentionally left blank)

wyle laboratories

NOTICE OF ANOMALY

| | |
|---|---|
| **DISPOSITION • COMMENTS • RECOMMENDATIONS:** The final disposition is pending a root cause analysis to be presented by the client. | |
| Potential 10 CFR Part 21 ☐ YES ☒ NO | |
| RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☒ CUSTOMER ☐ WYLE | |
| CAR Required: ☐ YES ☒ NO | CAR No. |
| VERIFICATION: | PROJECT ENGINEER: 7/12/13 |
| TEST WITNESS: 7/12/13 | PROJECT MANAGER: 07/12/13 |
| REPRESENTING: FS&S | INTERDEPARTMENTAL COORDINATION: N/A |
| QUALITY ASSURANCE: | |

(The remainder of this page intentionally left blank)

WH-1066, Rev. MAR '09 Page 2 of 2

Field Issue Resolution Process

| | | |
|---|---|---|
| Date Reported | | 7/11/2013 |
| Report Date | | 9/6/2013 |
| Who is Reporting the Issue? | | Dyne Engineering |
| Field Description of the Issue | | Power supply damaged during test (NTS # 3 of 7) |
| Supplemental Information | What location is reporting the issue? | Wyle Labs |
| | Equipment Affected (Model & Rev No) | DS200, 1.3 |
| | What Version of Software are They Running: | FLEVS1500 |
| | Has the Issue Been Confirmed or Duplicated | Yes |
| | By Who | Paul Huffman |
| | How | Lightning Surge Test |

*Implement Action Plan*

| | | | |
|---|---|---|---|
| 1. Assign Field Issue Tracking Number | | | |
| 2. Notify Reg Asst Mgr, Cust Svc Mgr, Cert | | | Sue McKay |
| 3. Assess Warehouse Inventory as required | | | na |
| 4. Categorize Issue | Software | Notify Dir | na |
| | | Submit RCB | na |
| | Hardware | Notify Dir | |
| | | Identify Product Line Manager | Paul Huffman |
| | | Is situation known | NO |
| 5. Conference Call (date) | What are the customer expectations? Immediate customer action | Short Term | na |
| | | Long Term | |
| | Is info gathered sufficient to resolve? | | |
| | Engineering site visit required? | | Yes |
| | Arrange return of equipment? | | no |
| 6. Find Root Cause | Workmanship? Wire/Harness? Design? Other? Faulty Capacitor | How to fix? | Add TripleLite Spike Tube |
| | | What prevents future occurrences? | Add to QC checklist |
| 7. Confirm Solution | | Describe how fix was verified. | Retest at Wyle was successful |
| | | How does this solution impact the certified configuration? | Ultimate testing already complete |
| | | What additional customer testing required? | na |

wyle laboratories

| NOTICE OF ANOMALY | | DATE: 07/12/2013 |
|---|---|---|
| NOTICE NO: 2 | P.O. NUMBER: ES&S-MSA-TA029 | CONTRACT NO: N/A |
| CUSTOMER: ES&S | | WYLE JOB NO: T71013.01 |
| NOTIFICATION MADE TO: Paul Hallman | | NOTIFICATION DATE: 07/12/2013 |
| NOTIFICATION MADE BY: Ryan Chambers | | VIA: In person |

CATEGORY: [X] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: 07/12/2013
PART NAME: DS200 PART NO. DS200
TEST: Lightning Surge Test (LST) I.D. NO: DS031335D009
SPECIFICATION: VVSG Volume I
PARA. NO. Section 4.1.2.7

**REQUIREMENTS: 2005 VVSG Volume I: Section 4.1.2.4**

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, surges of:

a. +2 kV AC line to line
b. +2 kV AC line to earth
*c. + or – 0.5 kV DC line to line >10m
*d. + or – 0.5 kV DC line to earth >10m
*e. + 1 kV I/O sig/control >30m

*Indicates requirements that do not apply to the Unit Under Test (UUT), due to the fact that UUT does not contain DC lines in excess of 10 Meters, nor does it contain any I/O lines greater than 30 meters.

**DESCRIPTION OF ANOMALY:**

After the being subjected to the Lightning Surge Test (LST) being performed on July 12, 2013 the AC Power Adapter ceased to function and as a result, the DS200 suffered a disruption of normal operation. The AC Power Adapter ceased to function, during application of 2 kV. The failure occurred at pulse 4 of 7 Sync: 0°/60Hz between the Path L1--N. Photographs were taken of the testing site.

Component Description: AC Power Adapter
Manufacturer: Power-Win Technology Corp.
Model: PW-080A2-1Y24AF

(The remainder of this page intentionally left blank)

WI-1054, Rev. MAF-10 Page 1 of 2

wyle laboratories

NOTICE OF ANOMALY

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**
The final disposition is pending a root cause analysis to be presented by the client.

Potential 10 CFR Part 21 ☐ YES ☒ NO

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☒ CUSTOMER ☐ WYLE

CAR Required. ☐ YES ☒ NO CAR No.

VERIFICATION:

TEST WITNESS: 7/17/13

REPRESENTING: ES&S

QUALITY ASSURANCE:

PROJECT ENGINEER: 7/17/13

PROJECT MANAGER: 07/17/13

INTERDEPARTMENTAL COORDINATION: N/A

(The remainder of this page intentionally left blank)

WYLE LABORATORIES, INC.
Huntsville Facility

Field Issue Resolution Process

| | | |
|---|---|---|
| Date Reported | | 7/11/2013 |
| Report Date | | 8/6/2013 |
| Who is Reporting the Issue? | | Ryan Engineer |
| Field Description of the Issue | | Power supply damaged during test (NTA #T-871) |
| Supplemental Information | What location is reporting the issue? | Wyle Labs |
| | Equipment Affected (Model & Rev No.) | DS200, 1.3 |
| | What Version of Software are They Running: | FLEVS1500 |
| | Has the Issue Been Confirmed or Duplicated | Yes |
| | By Who | Paul Huffman |
| | How | Lightning Surge Test |

Implement Action Plan

| | | | |
|---|---|---|---|
| 1. Assign Field Issue Tracking Number | | | |
| 2. Notify Reg Asst Mgr, Cust Svc Mgr, Cert | | | Sue McKay |
| 3. Assess Warehouse Inventory as required | | | na |
| 4. Categorize Issue | Software | Notify Dir | na |
| | | Submit RCR | na |
| | Hardware | Notify Dir | |
| | | Identify Product Line Manager | Paul Huffman |
| | | Is situation known: | NO |
| 5. Conference Call (date) | What are the customer expectations? Immediate customer action | Short Term | na |
| | | Long Term | |
| | Is info gathered sufficient to resolve? | | |
| | Engineering site visit required? | | Yes |
| | Arrange return of equipment? | | no |
| 6. Find Root Cause | Workmanship? Wire/Harness? Design? Other? Faulty Capacitor | How to fix? | Add TripleLite Spike Tube |
| | | What prevents future occurrences? | Add to QC checklist |
| 7. Confirm Solution | | Describe how fix was verified. | Retest at Wyle was successful |
| | | How does this solution impact the certified configuration? What additional customer testing required? | Ethernet testing already complete<br>na |

wyle laboratories ORIGINAL

| NOTICE OF ANOMALY | | DATE: 08/28/2013 |
|---|---|---|
| NOTICE NO: 4 (a) | P.O. NUMBER: ES&S MSA-TAD29 | CONTRACT NO: N/A |
| CUSTOMER: Election Systems and Software (ES&S) | | WYLE JOB NO: T71013.01 |
| NOTIFICATION MADE TO: Paul Huffman | | NOTIFICATION DATE: 08/13/2013 |
| NOTIFICATION MADE BY: Ryan Chambers | | VIA: In person |
| CATEGORY: [x] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT | | DATE OF ANOMALY: 08/13/2013 |
| PART NAME: EVS 4.5.0.0 FL | | PART NO: DS200 |
| TEST: Electromagnetic Susceptibility Test (EST) | | I.D. NO: DS03133S0009 |
| SPECIFICATION: FAC 2005 VVSG, Volume I | | PARA. NO: Section 4.1.2.10 |

**REQUIREMENTS:**

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 ANOMALY:**

The EUT was oriented at 180 degrees, with the back of the EUT facing the Aantenna. The Aantenna was oriented in the Vertical position. Upon exposure to an electromagnetic field of 10 V/m modulated by a 1kHz 80% AM modulation over the frequency range of 80 MHz to 1000 MHz, the DS200 suffered disruption of normal operation. The shoeshine setup menu was available on the display and the shoeshine ballot was hanging from the front of the DS200 paper path.

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**

The final disposition is pending a root cause analysis to be presented by ES&S.

Safety Related: [ ] YES [x] NO Potential 10 CFR Part 21: [ ] YES [ ] NO [x] N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☐ WYLE

CAR Required: ☐ YES ☒ NO CAR No.

VERIFICATION:

TEST WITNESS: N/A PROJECT ENGINEER: 08/30/2013

REPRESENTING: N/A PROJECT MANAGER: 8/30/13

QUALITY ASSURANCE: 8/30/13 INTERDEPARTMENTAL COORDINATION: N/A

WH 1066, Rev. March '09 Page 1 of 1

Field Issue Resolution Process

| | | | |
|---|---|---|---|
| Date Reported | | | 3/28/2013 |
| Report Date | | | 9/9/2014 |
| Who is Reporting the Issue? | | | [illegible] |
| Brief Description of the Issue | | | Short skirt modification (WR-34) |
| Supplemental Information | What location is reporting the issue? | | Wyle Labs |
| | Equipment Affected (Model & Rev) | | DS2DC, 1.3 |
| | What Version of Software are they Running | | HLVS16U |
| | Has this Issue Been Confirmed or Duplicated | | Yes |
| | By Who | | Paul Huffman |
| | How | | Electromagnetic Susceptibility Test |

Implement Action Plan

| | | | |
|---|---|---|---|
| 1. Assign Field Issue Tracking Number | | | |
| 2. Notify Reg Asst Mgr, Asst Svc Mgr, Cert | | | Sue McKay |
| 3. Assess Warehouse Inventory as required | | | no |
| 4. Categorize Issue | Software | Notify Dir | no |
| | | Submit RCR | no |
| | Hardware | Notify Dir | |
| | | Identify Product Line Manager | Paul Huffman |
| | What are the customer expectations? | Is situation timely? | no |
| | | Short Term | no |
| | | Long Term | |
| 5. Conference Call Date: | Immediate customer action | | |
| | Is info gathered sufficient to resolve? | | |
| | Engineering site visit required? | | Yes |
| | Arrange return of equipment? | | no |
| 6. Find Root Cause | Workmanship? Wear/Handling? Design? Other? Faulty Capacitor | How to fix? | Double wrap service cable ferrite near scanner board |
| | | What prevents future occurrences? | |
| 7. Confirm Solution | | Describe how fix was verified. | Retest at Wyle was successful |
| | | How does this solution impact the certified configuration? | Official testing already complete |
| | | What additional customer testing required? | |
| Close out | Release Planning | What's planned for this | Change manufacturing process document |

wyle ORIGINAL
laboratories

| NOTICE OF ANOMALY | | DATE: 08/28/2013 |
|---|---|---|
| NOTICE NO: 5 | P.O. NUMBER: ES&S-MSA-TA029 | CONTRACT NO: N/A |
| CUSTOMER: Election Systems and Software (ES&S) | | WYLE JOB NO: T71013.01 |
| NOTIFICATION MADE TO: Paul Huffman | | NOTIFICATION DATE: 08/16/2013 |
| NOTIFICATION MADE BY: Ryan Chambers | | VIA: In person |
| CATEGORY: [x] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT | | DATE OF ANOMALY: 08/16/2013 |
| PART NAME: EVS 4.5.0.0 FI. | | PART NO. DS200 |
| TEST: Electromagnetic Susceptibility Test (EST) | | I.D. NO DS03133500009 |
| SPECIFICATION: EAC 2005 VVSG, Volume I | | PARA. NO. Section 4.1.2.10 |

**REQUIREMENTS:**

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 ANOMALY:**

The EUT was oriented at 0 degrees, with the front of the EUT facing the Antenna. The Antenna was oriented in the Vertical position. Upon exposure to an electromagnetic field of 10 V/m modulated by a 1kHz 80% AM modulation over the frequency range of 80 MHz to 1000 MHz, the DS200 suffered disruption of normal operation. The following error was displayed on the DS200 "1003059: Event Log Write Failed" and the sunshine ballot was hanging from the front of the DS200 paper path. When the EUT was unplugged from AC to be removed from the test chamber, the EUT unexpectedly shut off. The EUT would not power back on when only being supplied with DC power. When the EUT was plugged back into an AC outlet outside of the chamber, the EUT successfully powered on. After 5 minutes the plug was removed from the AC outlet, the EUT successfully switched to DC and displayed 75% power for the battery status. Within 3 minutes the EUT displayed 100% power. Within 1 minute the EUT displayed 50% power. Within 1 minute the EUT displayed 100% power.

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**

The final disposition is pending a root cause analysis to be presented by ES&S.

| | | | | | |
|---|---|---|---|---|---|
| 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 | ☐ WYLE |
| CAR Required: | ☐ YES | ☒ NO | CAR No. | | |

| | | | |
|---|---|---|---|
| VERIFICATION: | | PROJECT ENGINEER: | 08/30/2013 |
| TEST WITNESS: | N/A | PROJECT MANAGER: | 9/10/13 |
| REPRESENTING: | N/A | INTERDEPARTMENTAL COORDINATION: | N/A |
| QUALITY ASSURANCE: | 9/3/13 | | N/A |

WH 1056 Rev. March '09 Page 1 of 1

Field Issue Resolution Process

| | | | |
|---|---|---|---|
| Date Reported | | | 3/28/2013 |
| Report Date | | | 3/6/2013 |
| Who is Reporting the Issue? | | | [illegible] |
| Brief Description of the Issue | | | Panel lights were Lolled (802.3af) |
| Supplemental Information | What location is reporting the issue? | | Wyle Labs |
| | Equipment Affected (Model & Rev Rev) | | DS2DC, 1.3 |
| | What Version of Software are they Running | | HLVS16U0 |
| | Has this Issue been Confirmed or Duplicated | | Yes |
| | By Who | | Paul Huffman |
| | How | | Electromagnetic Susceptibility Test |

*Implement Action Plan*

| | | | |
|---|---|---|---|
| 1. Assign Field Issue Tracking Number | | | |
| 2. Notify Reg Asst Mgr, Cust Svc Mgr, Cert | | | Sue Mckay |
| 3. Assess Warehouse Inventory as required | | | no |
| 4. Determine Need for: ___ Conference Call ___ Customer Visit | Software | Modify Dir | no |
| | | Submit ECR | no |
| | Hardware | Modify Dir | |
| | | Identify Product Line Manager | Paul Huffman |
| | What are the customer expectations? | Is situation timely? | no |
| | | Short Term | no |
| | | Long Term | |
| | Immediate customer action | | |
| | Is info gathered sufficient to resolve? | | |
| | Engineering site visit required? | | Yes |
| | Arrange return of equipment? | | no |
| 5. Find Root Cause | Workmanship? Wear/Handling? Design? Other? Faulty Capacitor | How to fix? | Copper tape shielding of paper wires |
| | | What prevents future occurrences? | This modification will be added to the checklist to ensure application of tape |
| 7. Confirm Solution | | Describe how fix was verified. | Retest at Wyle was successful |
| | | How does this solution impact the certified configuration? | Official testing already complete |
| | | What additional customer testing required? | |
| Close out | Release Planning | What's planned for this | Add copper tape during manufacturing process |

wyle laboratories ORIGINAL

**NOTICE OF ANOMALY** DATE: 08/28/2013

NOTICE NO: 6 P.O. NUMBER: ES&S-MSA-1A029 CONTRACT NO: N/A
CUSTOMER: Election Systems and Software (ES&S) WYLE JOB NO: T71013.01
NOTIFICATION MADE TO: Paul Huffman NOTIFICATION DATE: 08/19/2013
NOTIFICATION MADE BY: Ryan Chambers VIA: In person

CATEGORY: [X] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: 08/17/2013
PART NAME: EVS 4.5.0.0 FL PART NO. DS200
TEST: Electromagnetic Susceptibility Test (ESD) I.O. NO. DS031330009
SPECIFICATION: EAC 2005 VVSG, Volume I PARA. NO. Section 4.1.2.10

**REQUIREMENTS:**

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 ANOMALY:**

The EUT was oriented at 0 degrees, with the back of the EUT facing the Antenna. The Antenna was oriented in the Vertical position. Upon exposure to an electromagnetic field of 10 V/m modulated by a 1kHz 80% AM modulation over the frequency range of 80 MHz to 1000 MHz, the DS200 suffered disruption of normal operation. The shoeshine setup menu was available on the display and the shoeshine ballot was hanging from the front of the DS200 paper path. When the EUT was unplugged from AC to be removed from the test chamber for ES&S representative, the EUT unexpectedly shut off. The EUT would not power back on when only being supplied with DC power. When the EUT was plugged back into an AC outlet outside of the chamber, the EUT successfully powered on. After 5 minutes the plug was removed from the AC outlet, the EUT successfully switched to DC and displayed 75% power for the battery status.

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**

The final disposition is pending a root cause analysis to be presented by ES&S.

Safety Related: [ ] YES [X] NO Potential 10 CFR Part 21: [ ] YES [ ] NO [X] N/A
RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: [ ] CUSTOMER [ ] WYLE
CAR Required: [ ] YES [X] NO CAR No:

VERIFICATION:
TEST WITNESS: N/A
REPRESENTING: N/A
QUALITY ASSURANCE: 08/30/13

PROJECT ENGINEER: 08/30/2013
PROJECT MANAGER: 8/30/13
INTERDEPARTMENTAL COORDINATION: N/A
N/A

WH 1006, Rev. March 09 Page 1 of 1

Field Issue Resolution Process

| | | | |
|---|---|---|---|
| Date Reported | | | 3/28/2013 |
| Report Date | | | 3/6/2014 |
| Who is Reporting the Issue? | | | Ryan Chambers |
| Brief Description of the Issue | | | Unit Shuts off when A/C compressor (NOISE) |
| 2. Supplemental Information | What location is reporting the issue? | | Wyle Labs |
| | Equipment Affected (Model & Rev No) | | DS200, 1.3 |
| | What Version of Software are they Running | | HLEVS1UU |
| | Has this Issue Been Confirmed or Duplicated | | Yes |
| | By Who | | Paul Huffman |
| | How | | Electromagnetic Susceptibility Test |

*Implement Action Plan*

| | | | |
|---|---|---|---|
| 1. Assign Field Issue Tracking Number | | | |
| 2. Notify Reg Asst Mgr, Asst Sec Mgr, Cert | | | Sue Mckay |
| 3. Assess Warehouse Inventory as required | | | na |
| 4. Determine how | Software | Modify Dir | na |
| | | Submit RCR | na |
| | Hardware | Modify Dir | |
| | | Identify Product Line Manager | Paul Huffman |
| | | Is situation Initial? | yes |
| 5. Conference Call Date(s): | What are the customer requirements? | Short Term | na |
| | | Long Term | |
| | Immediate customer action | | |
| | Is info gathered sufficient to resolve | | |
| | Engineering site visit required? | | Yes |
| | Arrange return of equipment? | | no |
| 6. Root Cause Analysis | Workmanship? Wear/Handling? Design? Other? Faulty Capacitor | How to fix? | Replaced battery pack |
| | | What prevents future occurrences? | |
| 7. Confirm Solution | | Describe how fix was verified. How does this solution impact the certified configuration? | Retest at Wyle was successful<br>Official testing already complete |
| | | What additional customer testing required? | |
| 8. Release Planning | Release Planning | What's planned for this | |

wyle laboratories

ORIGINAL

**NOTICE OF ANOMALY** DATE: 09/16/2013

NOTICE NO: 7 (Rev A) P.O. NUMBER: ES&S-MSA TA029 CONTRACT NO: N/A
CUSTOMER: Election Systems and Software (ES&S) WYLE JOB NO: T71013.01
NOTIFICATION MADE TO: Paul Huffman NOTIFICATION DATE: 08/20/2013
NOTIFICATION MADE BY: Ryan Chambers VIA: In person

CATEGORY: [ ] SPECIMEN [X] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: 08/20/2013
PART NAME: EVS 4.5.0.0 FI PART NO.
TEST: Low Temperature I.D. NO. DS0313350009
SPECIFICATION: DAC 2005 VVSG, Volume II PARA. NO. Section 4.6.4

**REQUIREMENTS:**

The low temperature test simulates stresses faced during storage of voting machines and ballot counters. All system components, regardless of type, shall meet the requirements of this test. This test is equivalent to the procedure of MIL-STD-810D, Method 502.2, Procedure I-Storage. The minimum temperature shall be -4 degrees F. As outlined in the VVSG 4.6.4.2 Procedure, the following procedure is identified in Step 5: Allow the internal temperature of the equipment to stabilize at laboratory conditions before removing it from the chamber.

**DESCRIPTION OF ANOMALY:**

The technician removed the EUT from the environmental chamber approximately 1 hour after the internal temperature of the thermal chamber was returned to standard laboratory conditions. The technician did not allow the internal temperature of the equipment to stabilize at laboratory conditions before removing it from the chamber. As a result the accumulated moisture on the circuit board of the scanner assembly module caused a short circuit when the EUT was powered on. This anomaly was directly caused by human error in following the VVSG standard and the Wyle Operating Procedures.

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**

The final disposition was to counsel and retrain all of the Wyle technicians on the associated Wyle Operating Procedure.

Safety Related: [ ] YES [X] NO Potential 10 CFR Part 21: [ ] YES [ ] NO [X] N/A
RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: [ ] CUSTOMER [ ] WYLE

CAR Required: [ ] YES [X] NO CAR No.

VERIFICATION:
TEST WITNESS: N/A
REPRESENTING: N/A
QUALITY ASSURANCE:

PROJECT ENGINEER: 09/16/2013
PROJECT MANAGER: 9/12/13
INTERDEPARTMENTAL COORDINATION: N/A
N/A

WI-1060, Rev. March '98 Page 1 of 1

wyle laboratories ORIGINAL

**NOTICE OF ANOMALY** DATE: 08/30/2013

NOTICE NO: 8 P.O. NUMBER: ES&S-MSA-TA029 CONTRACT NO: N/A
CUSTOMER: Election Systems and Software (ES&S) WYLE JOB NO: T71013.01
NOTIFICATION MADE TO: Paul Huffman NOTIFICATION DATE: 07/31/2013
NOTIFICATION MADE BY: Ryan Chambers VIA: In person

CATEGORY: [x] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: 07/31/2013
PART NAME: DVS 4.5.0.0 FL PART NO. ---
TEST: Electrostatic Disruption (ESD) I.D. NO. DS031335009
SPECIFICATION: EAC 2005 VVSG, Volume I PARA. NO Section 4.1.2.8

**REQUIREMENTS:**

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 ANOMALY:**

Upon application of +15 kV air discharge to the top-right corner of the black plastic ballot tray cover, located closest to the front right of the DS300 screen. It was observed that the DS200 had become completely unresponsive and required human intervention, by means of a system reboot, to regain normal operation of the DS200. A clicking sound was observed during operation of the EUT, thus the shoeshine ballot was replaced with a new ballot and the clicking sound was resolved. After rebooting the EUT, the same test point was subjected to ±2,4,8,15 kV air discharge, at which time the EUT continued normal operation throughout the remainder of the test.

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**

To ensure testing results where accumulated in accordance with the VVSG, the Electrostatic Disruption (ESD) was reperformed on 08/29/2013, for which there were no anomalies.
The final disposition is that the original observance could not be replicated.

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 ☐ WYLE
CAR Required: ☐ YES ☒ NO CAR No:

VERIFICATION:
TEST WITNESS: N/A PROJECT ENGINEER: 08/30/2013
REPRESENTING: N/A PROJECT MANAGER: 8/30/13
QUALITY ASSURANCE: 8/30/13 INTERDEPARTMENTAL COORDINATION: N/A N/A

WI-1085, Rev. March '09 Page 1 of 1

ATTACHMENT B

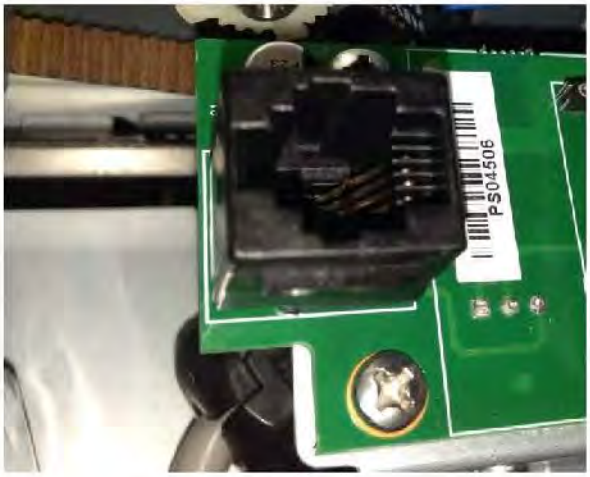
PHOTOGRAPHS


Photograph 1: ES&S FL EVS 4.5.0.0 PCA


Photograph 2: ES&S FL EVS 4.5.0.0 PCA


Photograph 3: ES&S FL EVS 4.5.0.0 PCA

Photograph 4: ES&S FL EVS 4.5.0.0 PCA




Photograph 5: ES&S FL EVS 4.5.0.0 PCA


Photograph 6: ES&S FL EVS 4.5.0.0 PCA

Photograph 7: ES&S FL EVS 4.5.0.0 PCA


Photograph 8: ES&S FL EVS 4.5.0.0 PCA


Photograph 9: ES&S FL EVS 4.5.0.0 PCA


Photograph 10: ES&S FL EVS 4.5.0.0 PCA


Photograph 11: ES&S FL EVS 4.5.0.0 Lightning Surge

Photograph 12: ES&S FL EVS 4.5.0.0 Lightning Surge

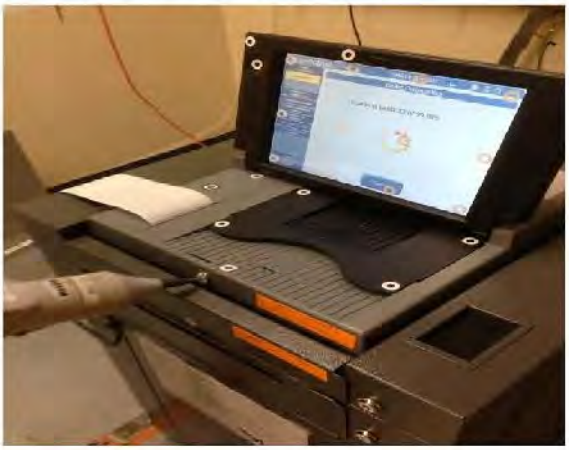

Photograph 13: ES&S FL EVS 4.5.0.0 Magnetic Fields Immunity

Photograph 14: ES&S FL EVS 4.5.0.0 Magnetic Fields Immunity

Photograph 15: ES&S FL EVS 4.5.0.0 Electromagnetic Emissions

Photograph 16: ES&S FL EVS 4.5.0.0 Electromagnetic Emissions

Photograph 17: ES&S FL EVS 4.5.0.0 Electrostatic Disruption

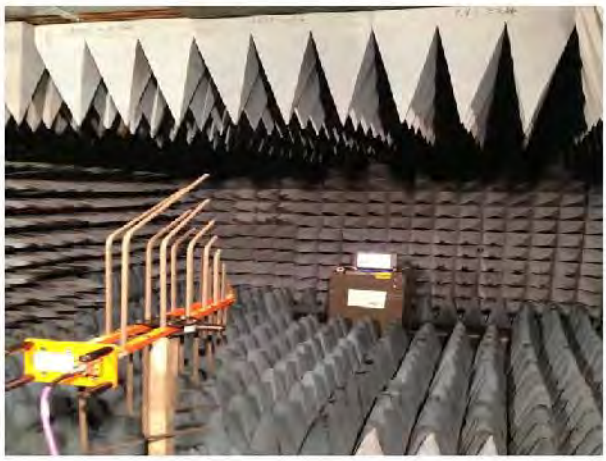


Photograph 18: ES&S FL EVS 4.5.0.0 Electrostatic Disruption

Photograph 19: ES&S FL EVS 4.5.0.0 Electrical Power Disturbance

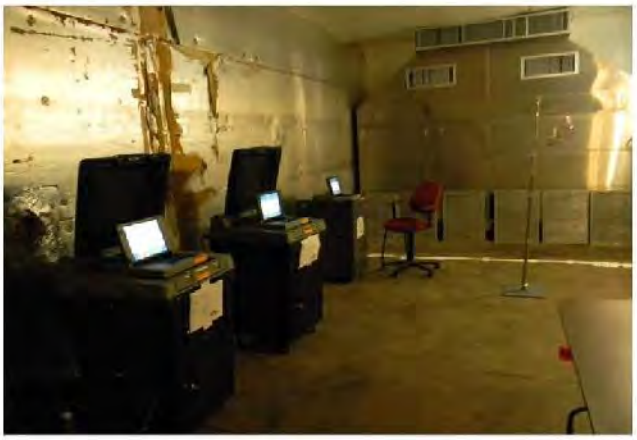
Photograph 20: ES&S FL EVS 4.5.0.0 Electrical Power Disturbance

Photograph 21: ES&S FL EVS 4.5.0.0 Electromagnetic Susceptibility



Photograph 22: ES&S FL EVS 4.5.0.0 Electromagnetic Susceptibility

Photograph 23: ES&S FL EVS 4.5.0.0 Temperature and Power Variation



Photograph 24: ES&S FL EVS 4.5.0.0 Temperature and Power Variation

Photograph 25: ES&S FL EVS 4.5.0.0 Bench Handling

Photograph 26: ES&S FL EVS 4.5.0.0 Bench Handling


Photograph 27: ES&S FL EVS 4.5.0.0 Humidity


Photograph 28: ES&S FL EVS 4.5.0.0 Humidity

Photograph 29: ES&S FL EVS 4.5.0.0 Low Temperature

Photograph 30: ES&S FL EVS 4.5.0.0 Low Temperature

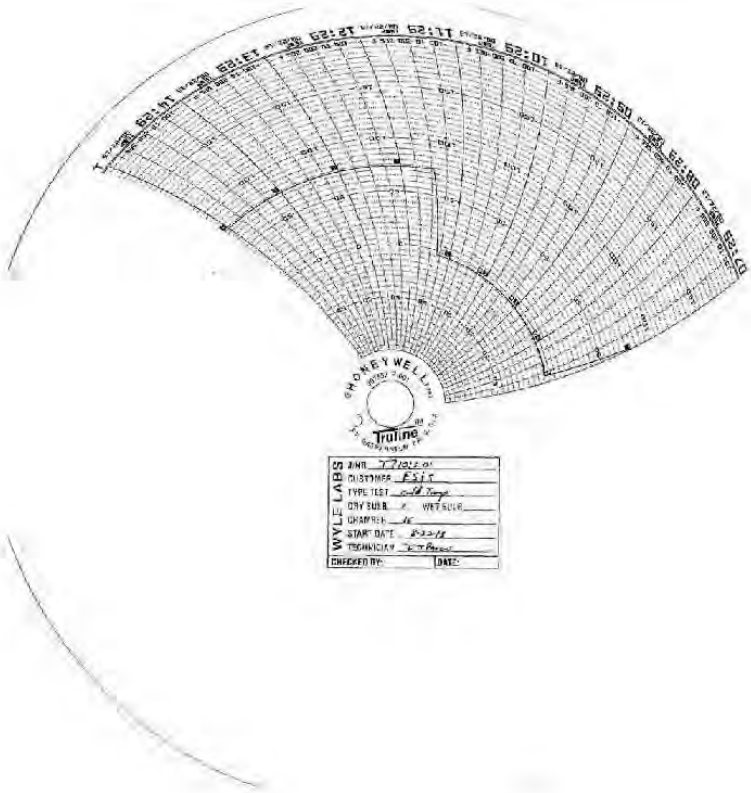
Photograph 31: ES&S FL EVS 4.5.0.0 High Temperature


Photograph 32: ES&S FL EVS 4.5.0.0 High Temperature

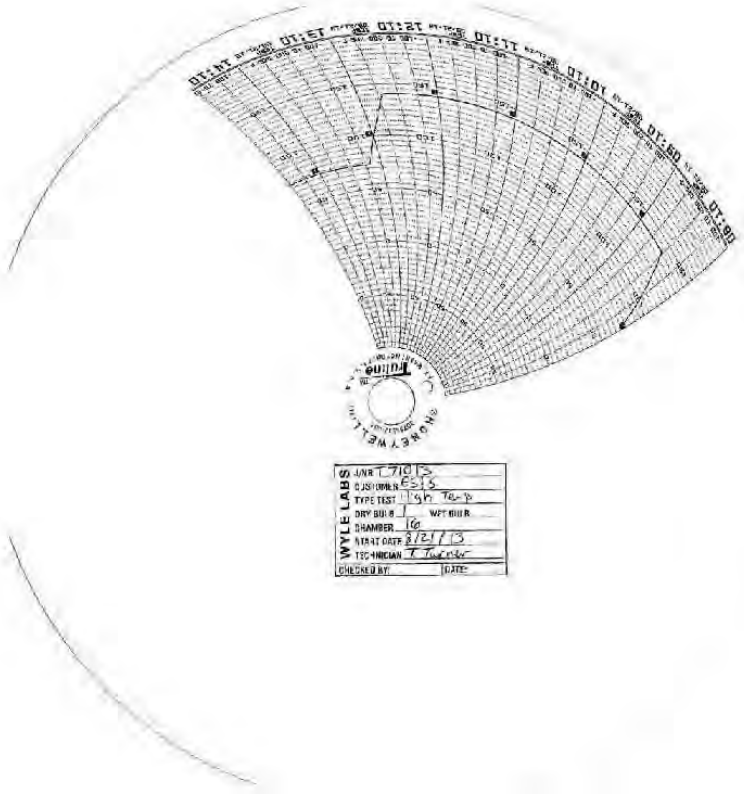
ATTACHMENT C

NON-OPERATING ENVIRONMENTAL TEST DATA

LOW TEMPERATURE TEST DATA


HONEYWELL
Trutrac
WYLE LABS
UNIT
CUSTOMER
TYPE TEST
DRY BULB
WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE

HIGH TEMPERATURE TEST DATA


WYLE LABS
JOB# T-71013
CUSTOMER ESIS
TYPE TEST High Temp
DRY BULB
WET BULB
CHAMBER 16
START DATE 8/21/13
TECHNICIAN
CHECKED BY
DATE

VIBRATION TEST DATA

# VIBRATION TEST DATA SHEET

Customer ES&S  Spec.  Specimen DS200 Hardshell & DS200 Plastic Case

Job No. T71013.01  Method  Part No.  Specimen Temp. Ambient

Test Title  SIN  Photo Yes [X] No [ ]

35i Yes [ ] No [X] Procedure

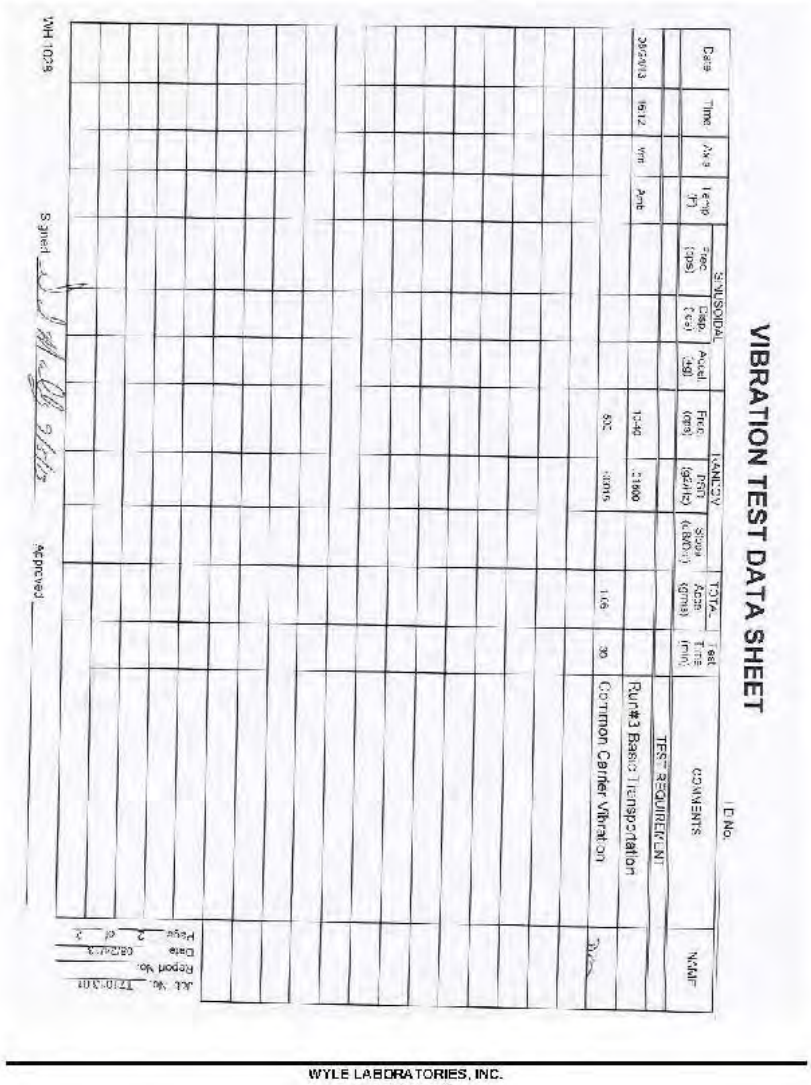
| Date | Time | Axis | Temp (F) | SINUSOIDAL Freq. (cps) | Disp. (Val.) | Accel (g's) | RANDOM Freq. (cps) | PSD (g²/Hz) | Slope (dB/Oct) | TOTAL Accel (grms) | Test Time (min) | COMMENTS | NAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/24/13 | 13:40 | Vert. | Amb. | | | | 10 | .00013 | | | | TEST REQUIREMENT | |
| | | | | | | | 20-80 | +3dB/oct | | | | Run#1 Basic Transportation | |
| | | | | | | | 80 | .00052 | | | | Common Carrier Vibration | |
| | | | | | | | 80-130 | +9dB/oct | | | | | |
| | | | | | | | 130 | .00001 | | | | | |
| | | | | | | | 500 | .00001 | | 2.66 | 30 | | |
| 08/24/13 | 14:42 | Long. | Amb. | | | | 10-20 | .00035 | | | | Run#2 Basic Transportation | |
| | | | | | | | 20 | .00052 | | | | Common Carrier Vibration | |
| | | | | | | | 20-80 | +3dB/oct | | | | | |
| | | | | | | | 80 | .00052 | | | | | |
| | | | | | | | 80-130 | +9dB/oct | | | | | |
| | | | | | | | 130 | .00001 | | | | | |
| | | | | | | | 500 | .00001 | | 2.49 | 30 | | |

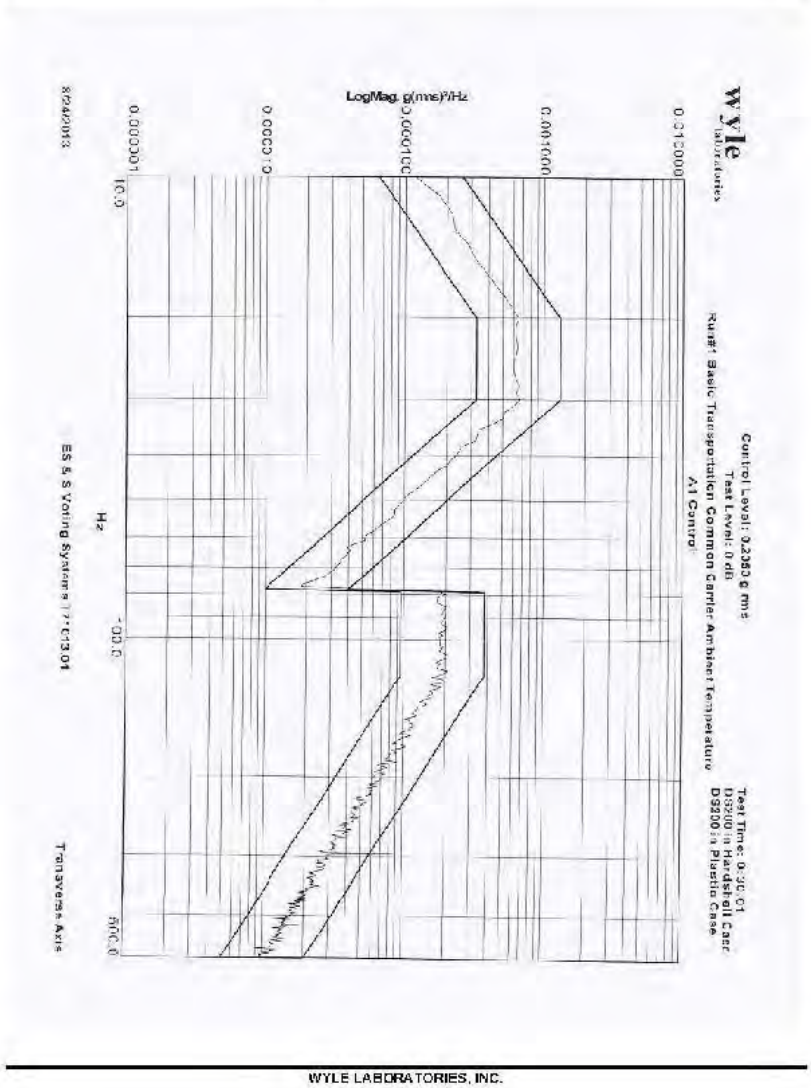
Job No. T71013.01
Report No.
Date 08/24/13
Page 1 of 2

WH-1095A

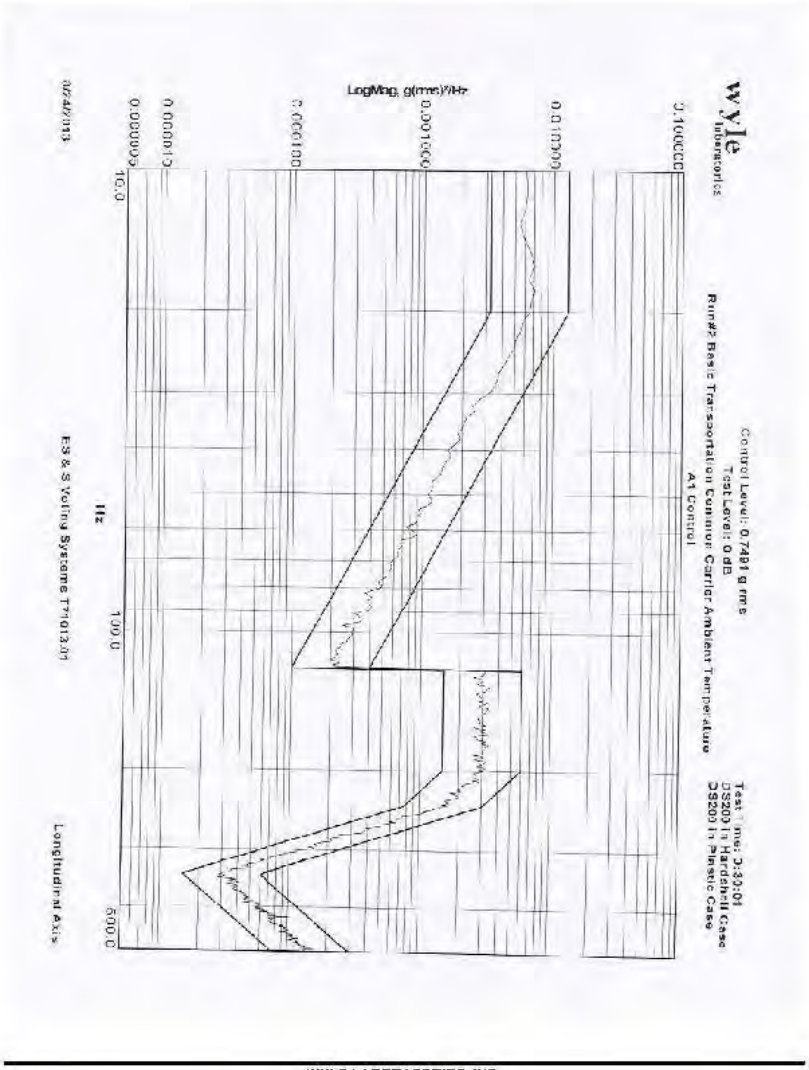
Signed  Approved

WYLE LABORATORIES, INC.
Huntsville Facility

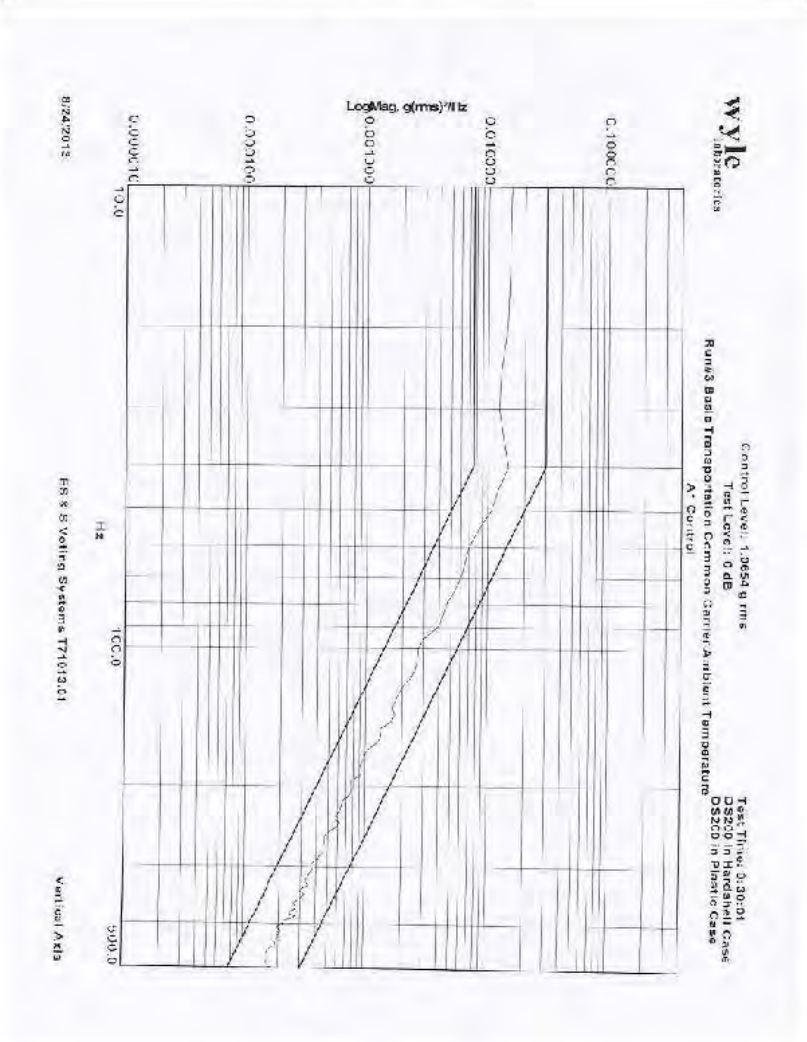

VIBRATION TEST DATA SHEET
SINUSOIDAL
RANDOM
Date
Time
Axis
Temp (°F)
Freq. (cps)
Displ. (+ or -)
Accel. (±g)
Freq. (cps)
PSD (g²/Hz)
Slope (dB/Oct.)
TOTAL Accel. (grms)
Test Time (min)
COMMENTS
TEST REQUIREMENT
NASA/T
ID No.
30/9/13
1612
vrm
Amb
1340
2.1600
6.02
1.45
30
Run #3 Basic Transportation
Common Carrier Vibration
WHL 1029
Sheet
Approved
Job No. T71013.01
Report No.
Date 08/24/13
Page 2 of 2




WYLE LABORATORIES, INC.
Huntsville Facility




WYLE LABORATORIES, INC.
Huntsville Facility




WYLE LABORATORIES, INC.
Huntsville Facility

BENCH HANDLING TEST DATA

wyle laboratories

## DATA SHEET

Customer ES&S
Specimen EVS 4500
Part No. DS200 Amb. Temp. ~75°F Job No. T71013
Spec. EAC 2005 VVSG Photo Yes Report No. T71013-01
Para. 4.6.2 Test Med. Air Start Date 8-28-13
S/N DS0313350010 & DS0313350006 Specimen Temp. Ambient

Test Title Bench Handling

Drop Height: 4"

| | EUT 1 | EUT 2 |
|---|---|---|
| Edge 1: Drops 1-6 | ✓ | ✓ |
| Edge 1: Drops 7-12 | ✓ | ✓ |
| Edge 1: Drops 13-18 | ✓ | ✓ |
| Edge 1: Drops 19-24 | ✓ | ✓ |

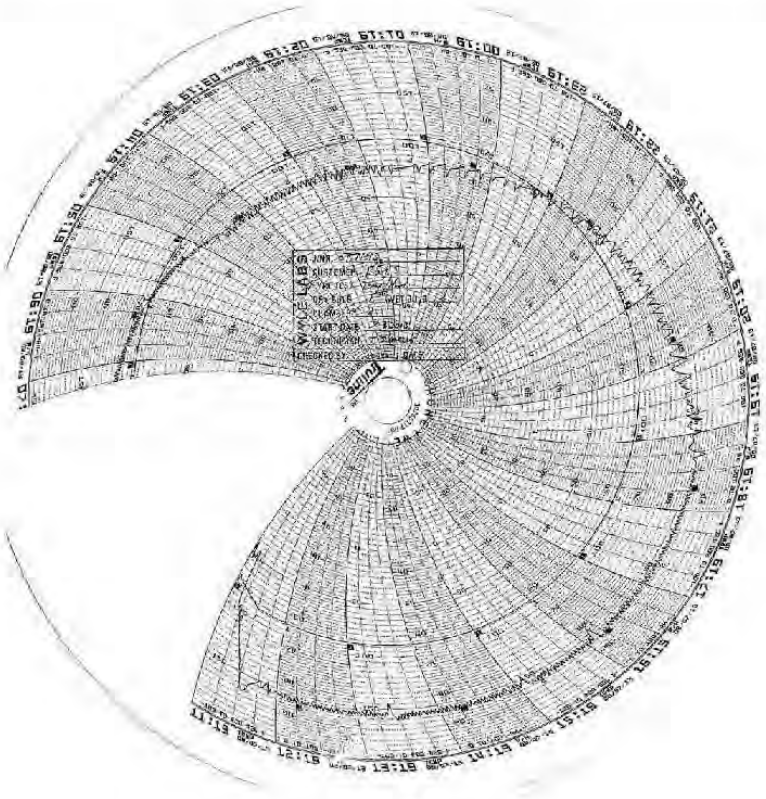
Post-Test Inspection: Post-DP Status check completed on both units under test without issue

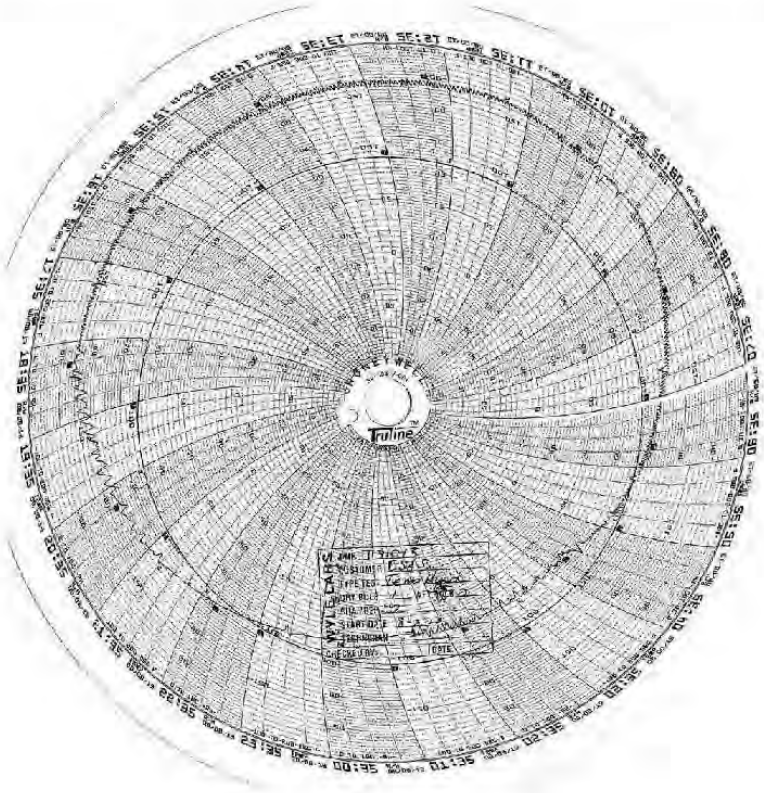
Test Passed & completed 8/26/13 10:25 A.M.

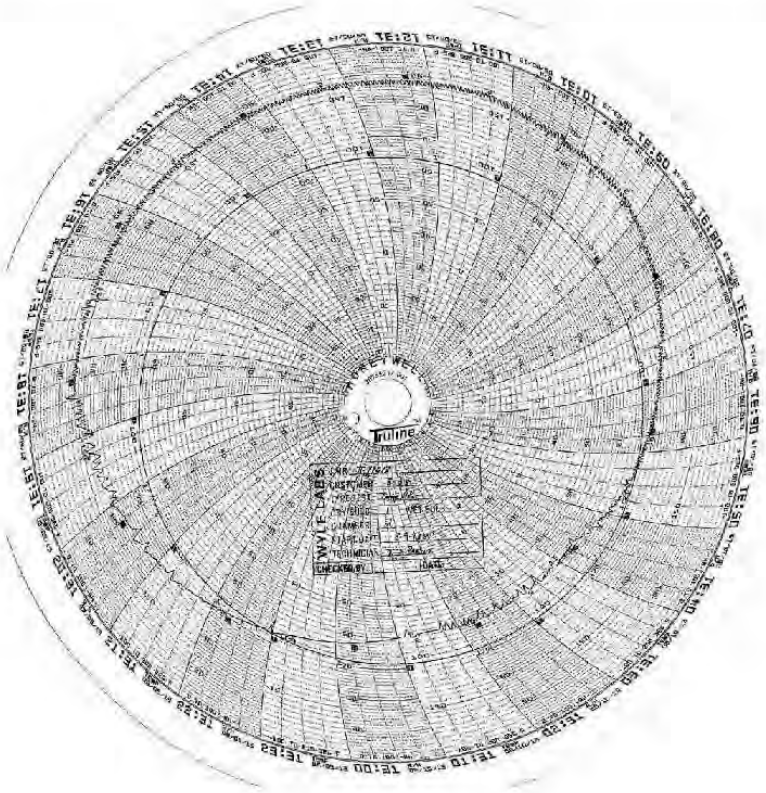
Tested By _____ (Technician) Date 8/26/13
Sheet No. 1 of 1
Notice of Anomaly N/A
Approved _____ (Project Engineer)

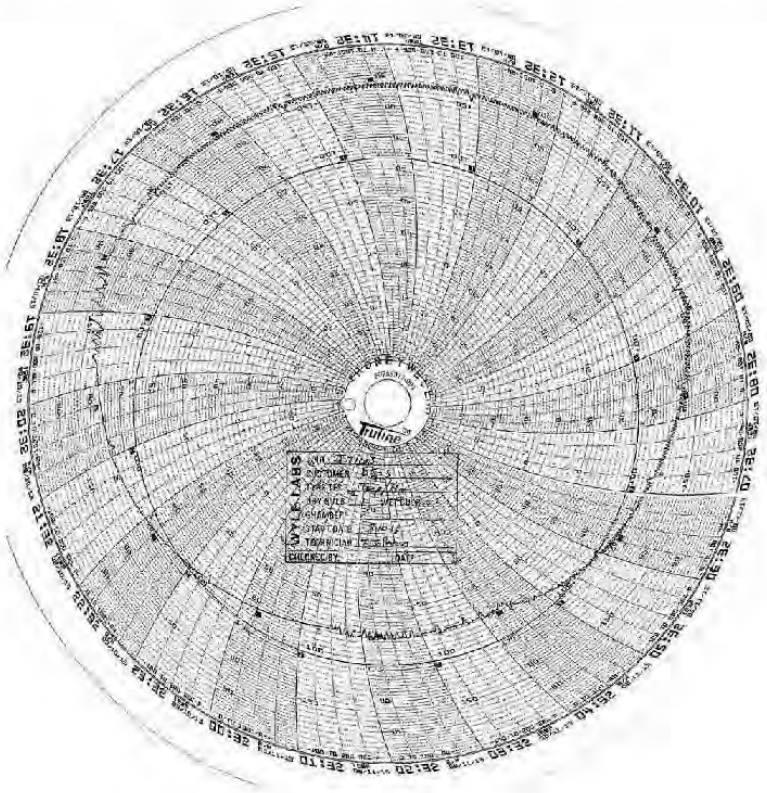
Wyle Form WH-514A, Rev. Jun 03

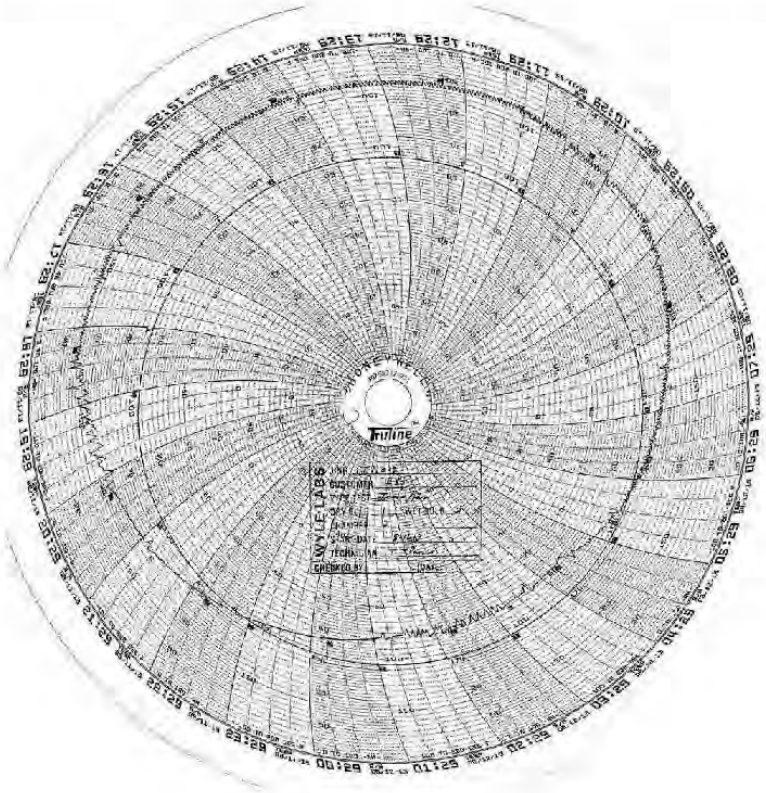
HUMIDITY TEST DATA

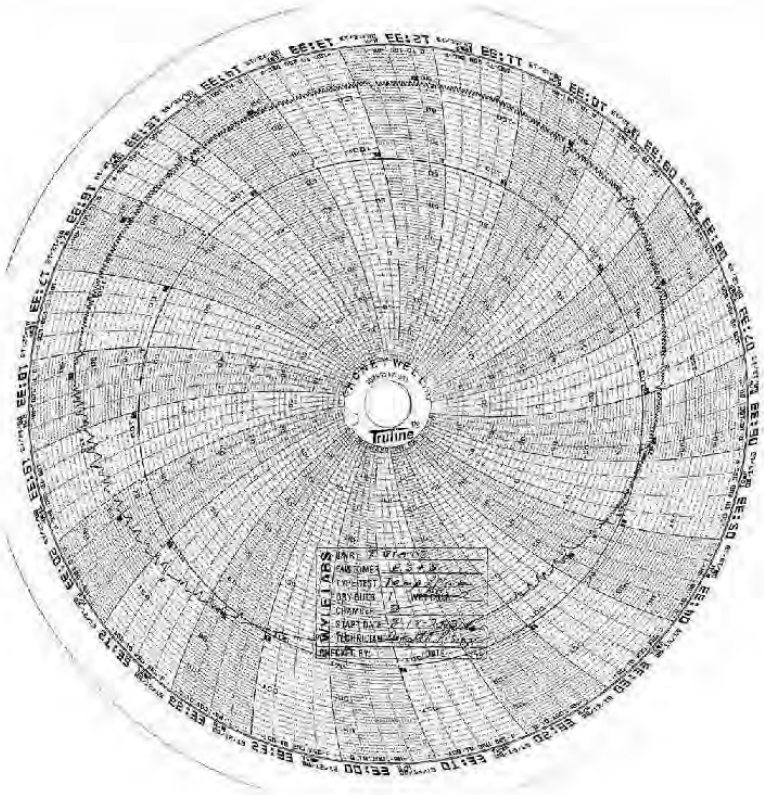


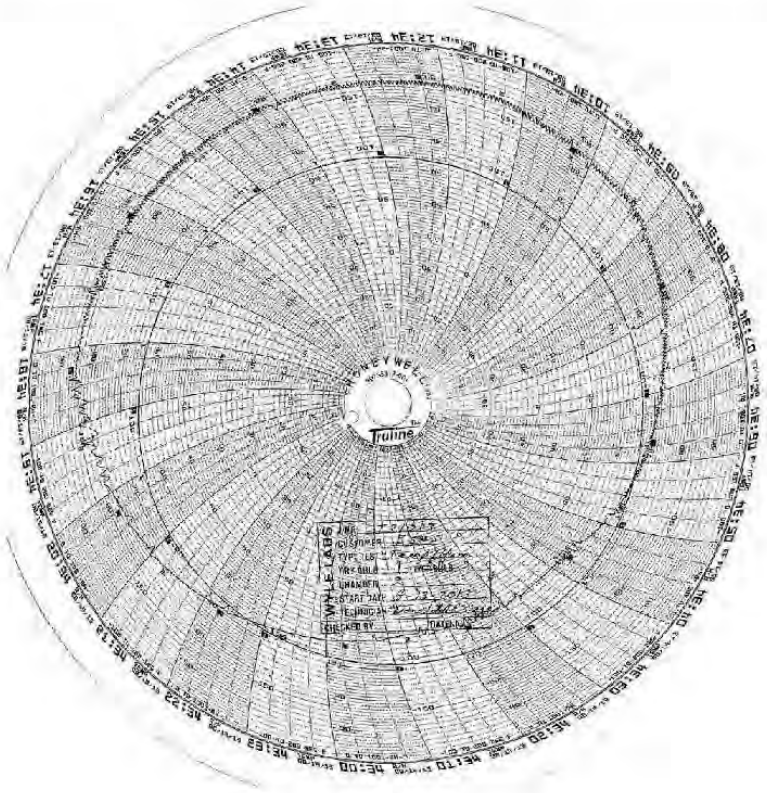

Truline

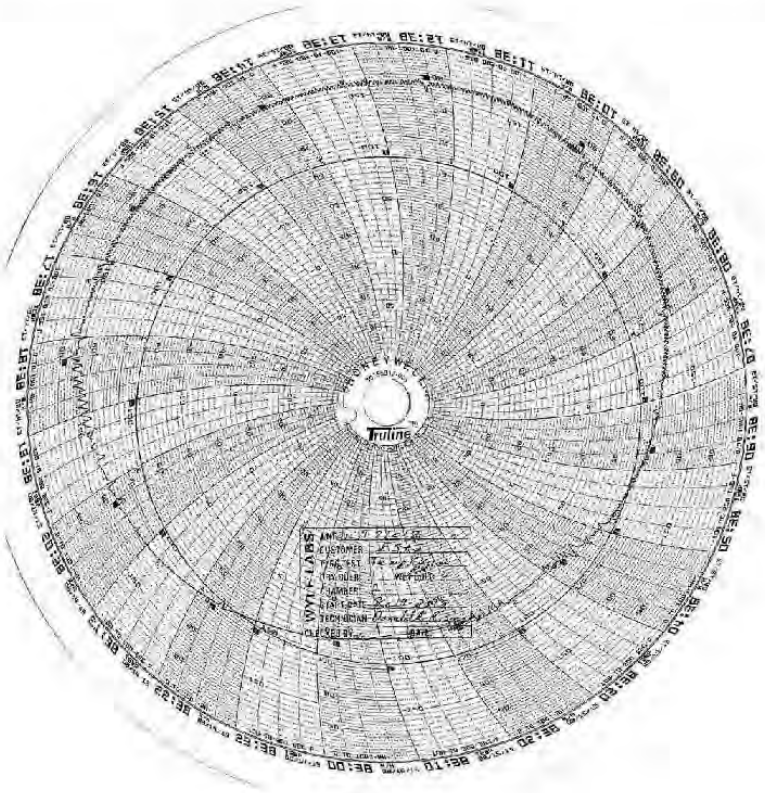

Truline
WYLE LABORATORIES

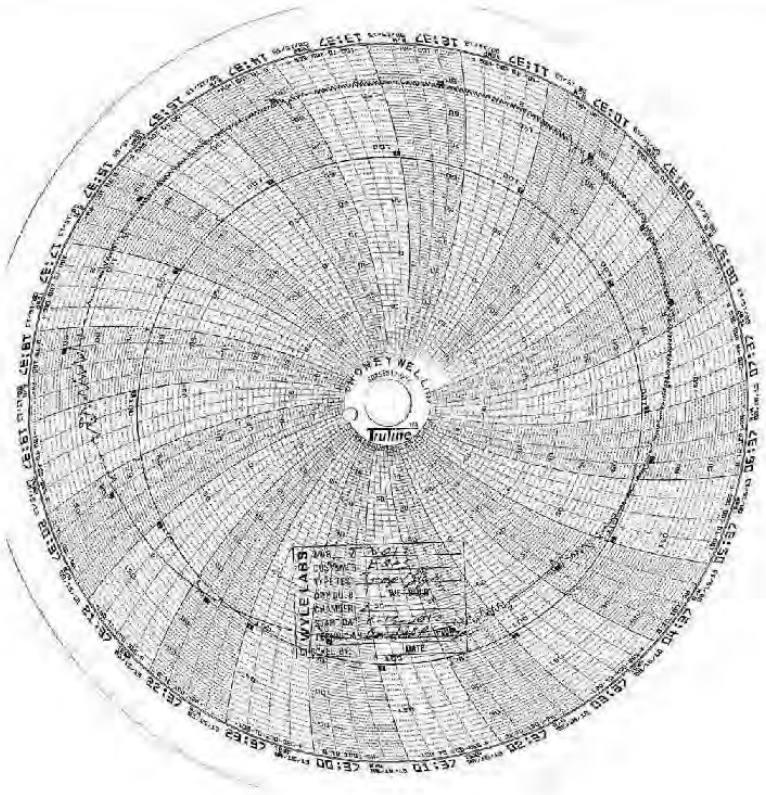

WYLE LABS
Trutime

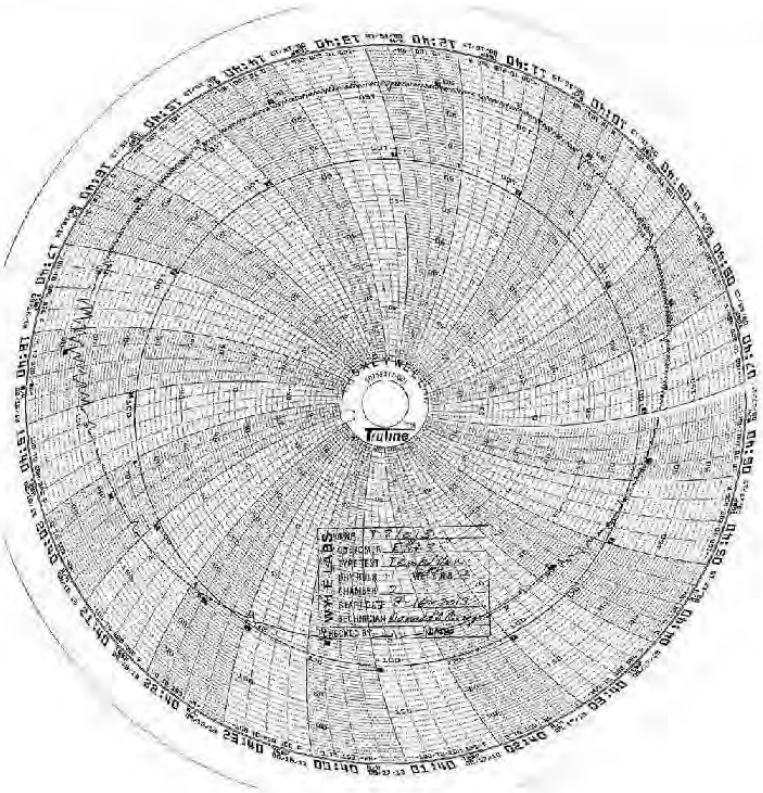

WYLE LABS
Trilline

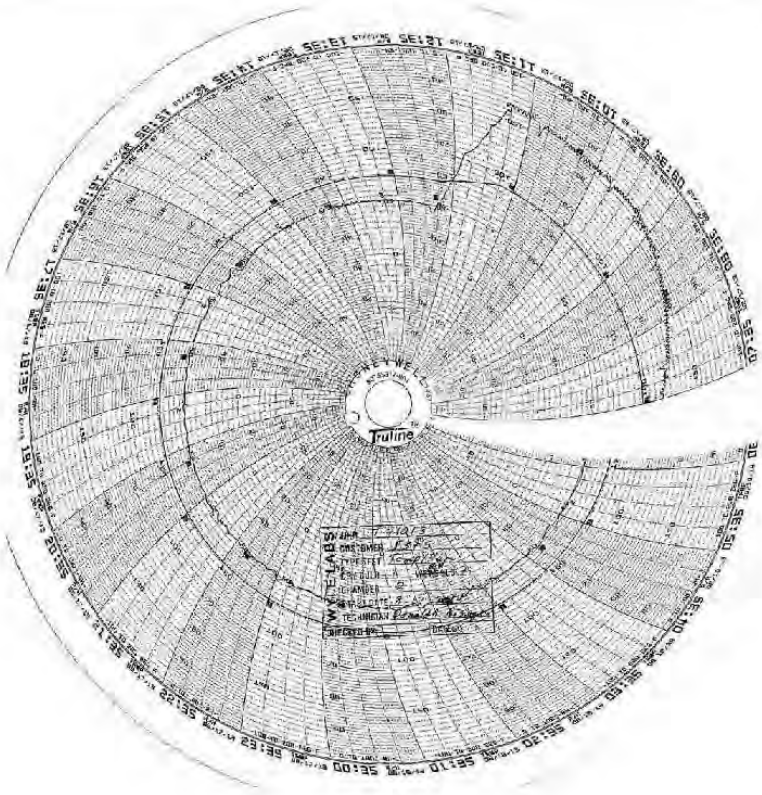

Truline
WYLE LABS




WYLE LABS
Truline


WYLE LABS
Tulinc




Truline

ATTACHMENT D

ELECTRICAL TEST DATA

ELECTROSTATIC DISRUPTION

wyle laboratories

# DATA SHEET

Job No.: T71013.01
Start Date: 8-29-2013
Customer: ES&S (page 1 of 2)
Temperature: 22.4°F
Humidity: 36%
EUT: 4500
Measurement Point: See Test Points Below
Model No.: DS200
Interference Signal: See Applied Signal
Serial No.:
Frequency Range: N/A
Test Title: Electrostatic Discharge

| Test Points | Meets Limit Yes | Meets Limit No | Applied Level (kV) | Discharge Type | Times Tested | Comments |
|---|---|---|---|---|---|---|
| TP001: Vertical Coupling Plane | ✓ | | ±2, 4, 8 | Contact | 10 | Each Side of EUT |
| TP002: DS200 USB Well keyhole | ✓ | | ±2, 4, 8 | Contact | 10 | Engineering Judgment determined TP002 & 003 TP004 |
| TP003: DS200 Front keyhole | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP004: Metal Ballot Box Front Upper Right Keyhole | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP005: Metal Ballot Box Front Lower Right Keyhole | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP006: Metal Ballot Box Top Right Rear Keyhole | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP007: Metal Ballot Box Right Ballot Box Door Keyhole | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP008: Metal Ballot Box Above Right Ballot Door | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP009: Metal Ballot Box Front Above the Auxiliary Slot | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP010: Metal Ballot Box Back Upper Center | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP011: Metal Ballot Box Above Left Ballot Box Door | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP012: Metal Ballot Box Left Ballot Box Door Keyhole | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP013: DS200 Modem Door Keyhole | ✓ | | ±2, 4, 8 | Contact | 10 | |
| TP014: DS200 Trunk Cover Left Rear | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP015: DS200 Trunk Cover Left Front | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP016: DS200 Back Cover Right Front | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP017: DS200 Trunk Cover Right Rear | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP018: DS200 Ballot Track Front Center | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP019: DS200 Screen Frame Front Rear Left Top Corner Interior | ✓ | | ±2, 4, 8, 15 | Air | 10 | |

Notice of Anomaly: None
Witness:
WI-T-431, Rev. Dec. 2004

Tested By: [signature] Technician Date: 08/29/2013
Approved: [signature] Project Engineer Date: 08/29/2013

wyle laboratories

# DATA SHEET

Job No.: T71013.01
Start Date: 8-29-2013
Customer: ES&S (Page 2 of 2)
Temperature: 22.4F
Humidity: 56%
EUT: 4500
Measurement Point: See Test Points Below
Model No.: DS200
Interference Signal: See Applied Signal
Serial No.:
Frequency Range: N/A
Test Title: Electrostatic Disruption

| Test Points | Meets Limit Yes | Meets Limit No | Applied Level (kV) | Discharge Type | Times Tested | Comments |
|---|---|---|---|---|---|---|
| TP020: DS200 Screen Frame Front-face Left Top Corner Exterior | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP021: DS200 Screen Frame Front-face Top Side | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP022: DS200 Screen Frame Front-face Top Right Corner | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP023: DS200 Screen Top Right Corner | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP024: DS200 Screen Top Right Center | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP025: DS200 Screen Top Left Center | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP026: DS200 Screen Top Left Corner | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP027: DS200 Screen Middle Left Side | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP028: DS200 Screen Middle Left-Center | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP029: DS200 Screen Middle Right-Center | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP030: DS200 Screen Middle Right Side | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP031: DS200 Screen Lower Right Corner | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP032: DS200 Screen Lower Middle Right | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP033: DS200 Screen Lower Left Corner | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP034: DS200 USB Door Rear | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP035: DS200 Screen Frame Left-face | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP036: DS200 Modem Door Rear | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP037: DS200 Rear Cover Front Corner | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP038: DS200 Rear Cover Right Side | ✓ | | ±2, 4, 8, 15 | Air | 10 | |
| TP039: DS200 Rear Cover Back | ✓ | | ±2, 4, 8, 15 | Air | 10 | |

Notice of Anomaly: ES
Witness:
WH-1472, Rev. Dec. 2004

Tested By: _____ Technician Date: 8/29/2013
Approved: _____ Project Engineer Date: 08/29/2013

ELECTRICAL POWER DISTURBANCE TEST DATA

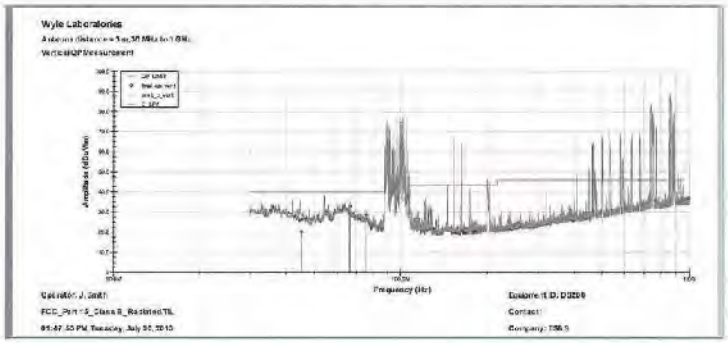
California Instruments Corp.
Data entry mode: Absolute

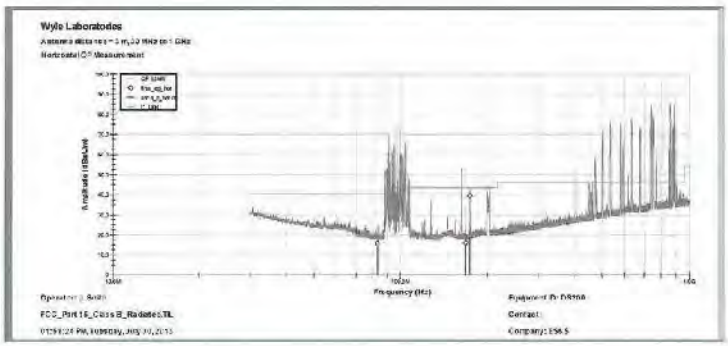
| No. | Type | Time (s) | Volt |
|---|---|---|---|
| 1 | V Step | 60.000 | 120.0 |
| 2 | V Step | 0.020 | 84.0 |
| 3 | V Step | 60.000 | 120.0 |
| 4 | V Step | 0.100 | 48.0 |
| 5 | V Step | 60.000 | 120.0 |
| 6 | V Step | 1.000 | 48.0 |
| 7 | V Step | 60.000 | 120.0 |
| 8 | V Step | 5.000 | 6.0 |
| 9 | V Step | 60.000 | 120.0 |
| 10 | V Step | 1.000 | 102.0 |
| 11 | V Step | 60.000 | 120.0 |
| 12 | V Step | 1.000 | 138.0 |
| 13 | V Step | 60.000 | 120.0 |
| 14 | V Step | 14400.000 | 129.0 |
| 15 | V Step | 60.000 | 120.0 |
| 16 | V Step | 14400.000 | 105.0 |
| 17 | V Step | 60.000 | 120.0 |
| 18 | Empty | | |

Transient List: <NEW>
Printed on: Friday, July 26, 2013 9:50:02 AM

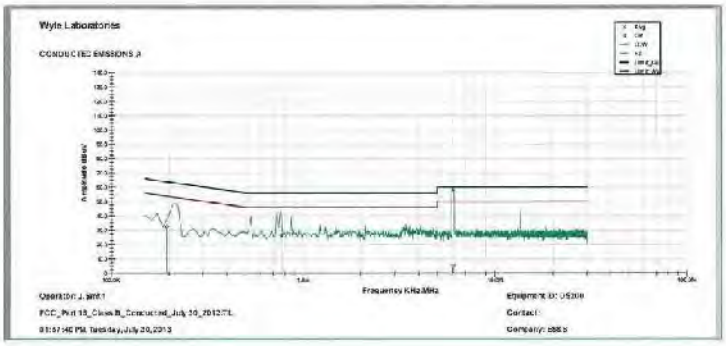
Page #1

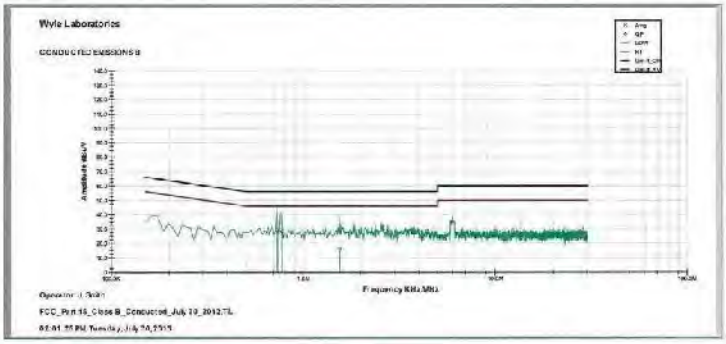
ELECTROMAGNETIC EMISSIONS: RADIATED EMISSIONS TEST DATA


Wyle Laboratories
Frequency (Hz)


Wyle Laboratories
Frequency (Hz)

ELECTROMAGNETIC EMISSIONS: CONDUCTED EMISSIONS TEST DATA


Wyle Laboratories
CONDUCTED EMISSIONS A
Frequency KHz/MHz


Wyle Laboratories
CONDUCTED EMISSIONS B
Frequency KHz/MHz

ELECTROMAGNETIC SUSCEPTIBILITY TEST DATA

wyle laboratories

# DATA SHEET

Job No.: T71013.01
Start Date: 23 Aug 13

Customer: B&B
EUT: DS200
Model No.: DS200
Serial No.: DS031350009

Temperature: 21.7° C
Humidity: 49.0%
Measurement Point: EUT @ All Four Sides
Interference Signal: 1Khz @ 80% AM
Frequency Range: 80Mhz to 1Ghz

Test Title: EN 61000-4-3 (Electromagnetic Susceptibility)

| Test Frequency | Meets Limit | | Susceptibility Threshold Level | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| ( )kHz (X)MHz ( )GHz | Yes | No | ( )A ( )V ( )kV (X)V/m ( )Vrms ( )dBµA ( )dBµV ( )dBpV/m ( )dBpT | | |
| 80 | X | | >10 | 10 | Vertical and Horizontal |
| ↓ | ↓ | | ↓ | ↓ | ↓ |
| 1,000 | X | | >10 | 10 | Vertical and Horizontal |

Notice of Anomaly: ____
Witness: ____

Tested By: _____ (Technician) Date: 8/23/13
Approved: _____ (Project Engineer) Date: 08/28/2013

Page ___ of ___

WYLE LABORATORIES, INC.
Huntsville Facility

ELECTRICAL FAST TRANSIENT TEST DATA

wyle laboratories

# DATA SHEET

Job No.: T71013.01
Start Date: 24 Jul 13

Customer: ES&S
EUT: DS200
Model No.: DS200
Serial No.: DS0313350009

Temperature: 21.7° C Humidity: 50.1%
Measurement Point: See Comments Below
Interference Signal: Test Signal Applied @ 5/50nS
Frequency Range: See Test Frequencies Below

Test Title: IEC1000-4-4 (Electrical Fast Transient)

| Test Frequency: (X)kHz ( )MHz ( )GHz | Meets Limit: Yes | No | Susceptibility Threshold Level: ( )A ( )V (X)kV ( )W/m ( )Vrms ( )dBµA ( )dBµV ( )dBµV/m ( )dBpT | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| .060 | X | | >1 | 1 | Line to Neutral |
| .060 | ↓ | | " | ↓ | Line to Ground |
| .060 | X | | >1 | 1 | Neutral to Ground |

Notice of Anomaly:
Witness:

Tested By: Technician Date: 7/24/13
Approved: Project Engineer Date: 07/24/2013

Page of

WYLE LABORATORIES, INC.
Huntsville Facility

LIGHTNING SURGE TEST DATA

wyle laboratories

# DATA SHEET

Job No.: T71013.01
Start Date: 22 Jul 13

Customer: ES&S
EUT: DS200
Model No.: DS200
Serial No.: DS0313350009

Temperature: 21.9 °C Humidity: 53.6%
Measurement Point: See Comments Below
Interference Signal: Test Signal Applied @ 1.2/50uS
Frequency Range: See Test Frequencies Below

Test Title: EN 61000-4-5 (Lightning Surge Test)

| Test Frequency (X)kHz ( )MHz ( )GHz | Meets Limit Yes | No | Susceptibility Threshold Level ( )A ( )V (X)kV ( )V/m ( )Vrms ( )dBuA ( )dBuV ( )dBuV/m ( )dBpT | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| .060 | X | | >.5 | .5 | Line to Neutral @ 0°, 90°, 180°, and 270° |
| .060 | ↓ | | ↓ | ↓ | Line to Ground @ 0°, 90°, 180°, and 270° |
| .060 | X | | >.5 | .5 | Neutral to Ground @ 0°, 90°, 180°, and 270° |
| .060 | X | | >1 | 1 | Line to Neutral @ 0°, 90°, 180°, and 270° |
| .060 | ↓ | | ↓ | ↓ | Line to Ground @ 0°, 90°, 180°, and 270° |
| .060 | X | | >1 | 1 | Neutral to Ground @ 0°, 90°, 180°, and 270° |
| .060 | X | | >2 | 2 | Line to Neutral @ 0°, 90°, 180°, and 270° |
| .060 | ↓ | | ↓ | ↓ | Line to Ground @ 0°, 90°, 180°, and 270° |
| .060 | X | | >2 | 2 | Neutral to Ground @ 0°, 90°, 180°, and 270° |

Notice of Anomaly: N/A: 1 & 7
Witness: [signature] 07/22/2013

Tested By: [signature] Date: 07/22/13
Technician
Approved: [signature] Date: 07/22/2013
Project Engineer

Page 1 of 1

WH 1432, Rev. Dec. 2008

CONDUCTED RF IMMUNITY TEST DATA

wyle laboratories

# DATA SHEET

Job No.: T71013.01
Start Date: 29 Jul 13

Customer: ES&S
EUT: DS200
Model No.: DS200
Serial No.: DS031338000

Temperature: 22.4° C
Humidity: 44.5%
Measurement Point: See Comments Below
Interference Signal: 1Khz @ 80% AM
Frequency Range: 150Khz to 800Mhz

Test Title: EN 61000-4-6 (Conducted RF Immunity)

| Test Frequency | Meets Limit | | Susceptibility Threshold Level | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| ( )kHz (X)MHz ( )GHz | Yes | No | ( )A (X)V ( )kV ( )V/m ( )V/rms ( )dBµA ( )dBµV ( )dBuV/m ( )dBpT | | |
| 150 | X | | >10 | 10 | AC Input |
| ↓ | ↓ | | ↓ | ↓ | ↓ |
| 80 | X | | >10 | 10 | AC Input |

Notice of Anomaly: Ø
Witness: N/A

Tested By: _____ Technician Date: 07/29/13
Approved: _____ Project Engineer Date: 07/29/2013

Page 1 of 1

WI-1410, Rev. Dec 2004

MAGNETIC FIELDS IMMUNITY TEST DATA

wyle laboratories

# DATA SHEET

Job No.: T71013.01
Start Date: 29 Jul 13

Customer: ES&S
EUT: DS200
Model No.: DS200
Serial No.: DS031335000#

Temperature: 22.1° C
Humidity: 49.9%
Measurement Point: See Comments Below
Interference Signal: CW for a Period of 5 Minutes
Frequency Range: See Test Frequencies Below

Test Title: EN 61000-4-8 (Magnetic Field Immunity)

| Test Frequency | Meets Limit | | Susceptibility Threshold Level | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| (X)kHz ( )MHz ( )GHz | Yes | No | (X)A ( )V ( )kV ( )V/m ( )Vrms ( )dBµA ( )dBµV ( )dBµV/m ( )dBpT | | |
| .060 | X | | >30 A/m | 30 A/m | EUT on X, Y, and Z Axis |

Notice of Anomaly: Ø
Witness: N/A

Tested By: [signature] Technician Date: 07/29/13
Approved: [signature] Project Engineer Date: 07/29/2013

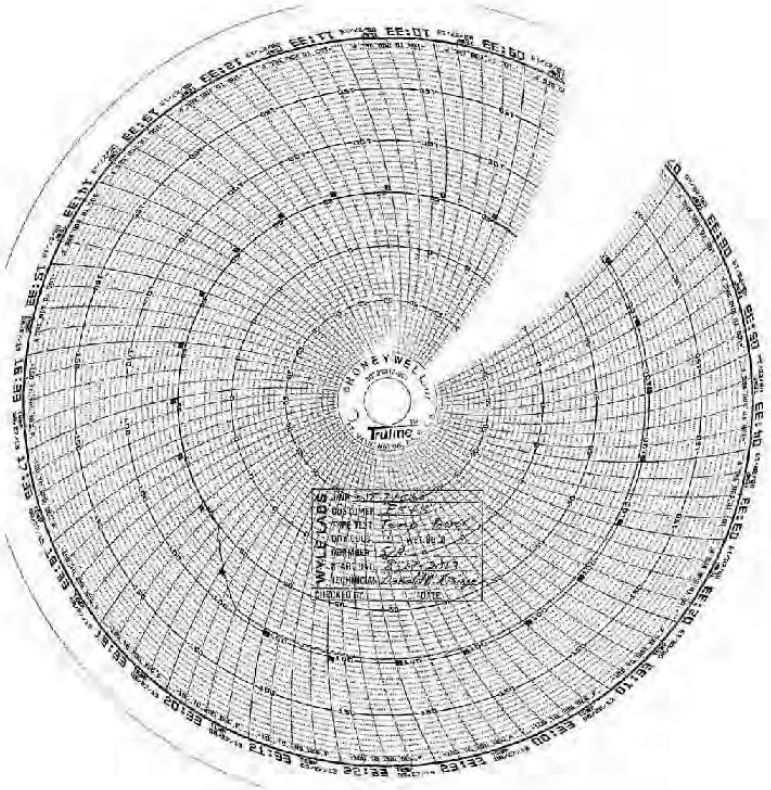
Page ___ of ___

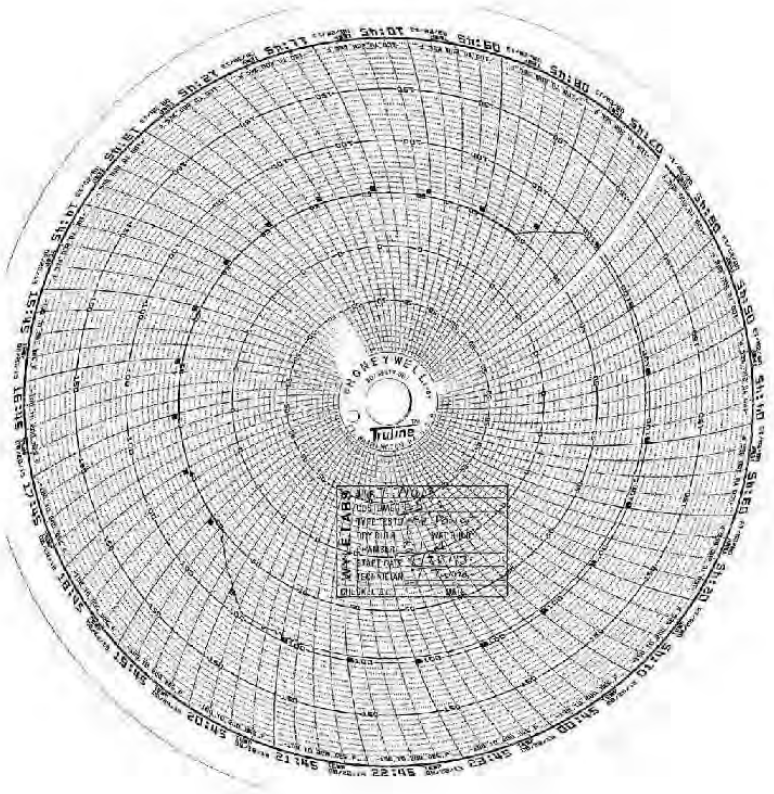
WYLE LABORATORIES, INC.
Huntsville Facility

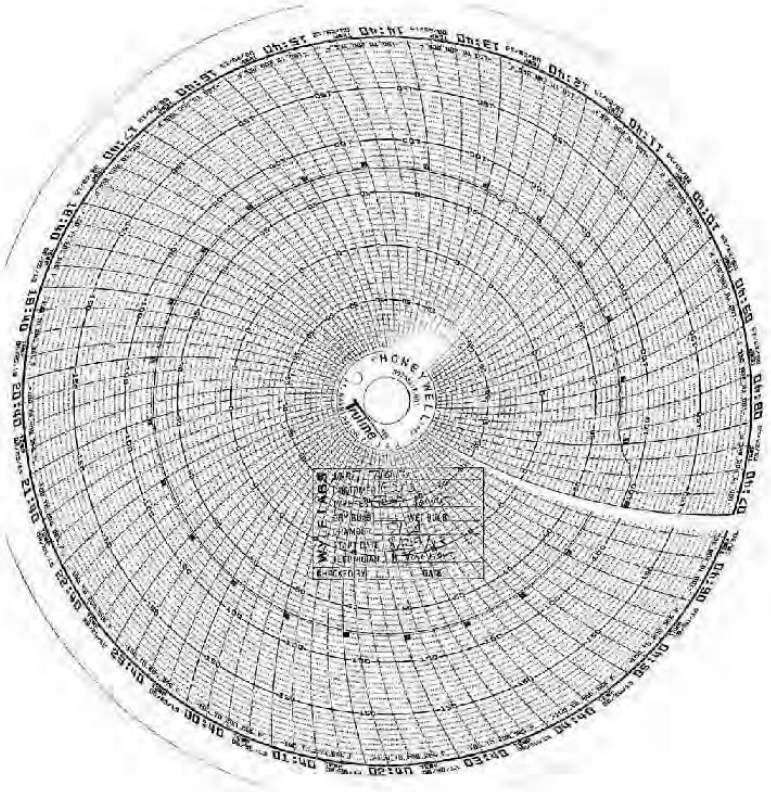
ATTACHMENT E

OPERATING ENVIRONMENTAL TEST DATA

TEMPERATURE/POWER VARIATION TEST DATA


HONEYWELL
Truline
WYLE LABS


HONEYWELL
Truline


HONEYWELL
Honeywell
WYLE LABS

ATTACHMENT F

PRODUCT SAFETY CERTIFICATE OF CONFORMANCE

wyle laboratories

7800 Highway 20 West
Huntsville, Alabama 35806
Phone (256) 837-4411
Fax (256) 721-0144
www.wylelabs.com

## CERTIFICATE OF CONFORMANCE

Product Safety Review

Wyle Project No. T71013-05
Customer PO ES&S-MSA-TA029
Issue Date 17 September 2013

The device exhibited below has been reviewed in accordance with the particular requirements of applicable sections of UL60950-1, Standard for Safety for Information Technology Equipment, Second Edition, and the Recommended Practice for Unlabeled Electrical Equipment Evaluation, First Edition, (developed by the American Council for Electrical Safety), and has been found to be in compliance.

| Product Identification | |
|---|---|
| Device Description | Voting Scanner/Tabulator |
| Manufacturer | Election Systems & Software |
| Device Model No. | DS200 |
| Device Serial No. | DS0313350009 |
| Electrical Ratings | Input 24 VDC – 2A - 80W Max. |
| Hardware Revision | 1.3 |
| Power Supply | |
| Power Supply Description | ITE Power Supply |
| Manufacturer | Power-Win Technology Corporation |
| Model No. | PW080A2-1Y24AP |
| Input | 100-240 VAC – 2A |
| Output | 24 VDC – 3.34A (80W max) |
| UL Listed ITE PS | UL File No. E156513 |

This report is valid for the equipment model and serial indicated in the product identification table above. Wyle makes no endorsement of the equipment reviewed, nor does this evaluation constitute approval of similar equipment. This evaluation does not constitute an product listing.

Brian Coppock NCT, Product Safety Supervisor
IN ARTE Certified Product Safety Technician No. PS-00458-NCT

Robert D. Hardy, Department Manager
EMI/EMC/FCC, Product Safety, Election Systems, & Packaging

Cert. No. 845.01

ATTACHMENT G

INSTRUMENTATION EQUIPMENT SHEETS

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 7/31/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG 4.1.2.1; CRFI

TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: EMI CHAMBER 3

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AMPLIFIER | AR | 2500A225 | 0342891 | 03162 | MFG | NCR | 7/24/2013 | 7/24/2020 |
| 2 | ATTEN | BIRD | 25-T-MN | 0129 | 03143 | 50 OHMS 25 W. | MFG | 6/24/2013 | 6/24/2014 |
| 3 | ATTENUATOR | NARDA | 769-6 | 03180 | 04860 | DC to 6GHz | MFG | 3/25/2013 | 3/25/2014 |
| 4 | DATALOGGER | EXTECH | 42280 | 0951839 | 04026 | -4°F to 144°F/20- | ±1°F/1.5%RH | 5/14/2013 | 5/14/2014 |
| 5 | DIR COUPLER | AMP RESEARCH | DC3010 | 304022 | 112208 | .01-1000MHz | ±0.8dB | 5/15/2013 | 5/15/2014 |
| 6 | DMM | FLUKE | 87V | 18290046 | 01474 | 4VDC | ±0.1%+1 | 12/6/2012 | 12/6/2013 |
| 7 | PASS IMP ADAPT | FISHER CC | FCC-801-150-50-CDF | 9784 | 110451 | 150KHz-230MH | MFG | 6/24/2013 | 6/24/2014 |
| 8 | PASSIVE | FISHER CC | FCC-801-150-50-CDF | 0409/004050 | 110405 | 150KHZ - 230M | MFG | 7/20/2012 | 7/20/2014 |
| 9 | SIG GEN | MARCONI | 2023 | 112229/002 | 112224 | 9KHz-1.2GHz | ±0.86B | 2/11/2013 | 2/11/2014 |
| 10 | SPEC ANAL | AGILENT | E4446A/H70 | US44020335 | 03123 | MFG | MFG | 5/10/2013 | 5/10/2014 |
| 11 | SPEC ANAL | HP | E4446a | US44020311 | 04047 | 44GHz | MFG | 8/6/2012 | 8/6/2013 |
| 12 | TAPE MEASURER | LUFKIN | HV1049CME | NSN | 027CS | 8inches | ±1mm | 4/24/2012 | 4/24/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 7/31/13 CHECKED & RECEIVED BY: 07/31/2013 7/31/13

WII-1029A,REV,APR 99 Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 7/30/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG 6.1.2.8 ESD

TECHNICIAN: J.GALBONE CUSTOMER: ES&S TEST AREA: ESD TEST LAB

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | DISCHARGE | EMC-PARTNER | ESD30000DM1 | 049 | 03229 | 150pF | MFG | 7/30/2012 | 7/30/2014 |
| 2 | DMM | FLUKE | 87V | 18250246 | 01474 | 4VDC | +0.1%+1 | 12/6/2012 | 12/6/2013 |
| 3 | ESD GUN | EMC-PARTNER | ESD3000 | 059 | 04446 | 16.5 KV | +10% | 10/1/2012 | 10/1/2013 |
| 4 | ESD TARGET | HAEFELY TRENCH | 2520311 | 197461 | 110704 | 15KV | 5% | 12/6/2011 | 12/6/2013 |
| 5 | OSCILLOSCOPE | TEKTRONIX | DPO5104 | C012091 | 01737 | MFG | MFG | 10/23/2012 | 10/23/2013 |
| 6 | TAPE MEASURER | LUFKIN | 1QV10WCME | NSN | 02708 | 5meters | ±1mm | 4/24/2012 | 4/24/2014 |
| 7 | TEMP/HUM/BAR | EXTECH | SD700 | Q990477 | 01539 | MULTI | MFG | 2/27/2013 | 2/27/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 7/30/13 CHECKED & RECEIVED BY: 07/30/2013

Q.A. 7/30/13

WH-1029A,REV,APR'99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 7/24/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG SECTION 4.1.2.6

TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: EMI LAB - CHAMBER 3

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ATTEN | HAEFELY TRENCH | 2520 11/00 | 153823 153801 | 04500 | MFP | MFP | 3/14/2012 | 3/14/2014 |
| 2 | DMM | FLUKE | 87V | 18290046 | 01474 | 4VDC | ±0.1%+1 | 12/6/2012 | 12/6/2013 |
| 3 | EFT JUNIOR TSTR | HAEFELY TRENCH | 093204.1 | 83762-14 | 112575 | SN/S/SONS | 10% | 12/28/2012 | 12/28/2014 |
| 4 | OSCILLOSCOPE | TEKTRONIX | DPO3104 | C012053 | 01737 | MFP | MFP | 10/23/2012 | 10/23/2013 |
| 5 | TAPE MEASURER | LUFKIN | HV1048CME | NSN | 02703 | Meters | ±1mm | 4/24/2012 | 4/24/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 7/24/13 CHECKED & RECEIVED BY: 07/24/2013

Q.A.: 7/24/13

WI-1029A,REV.APR99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 7/30/2013 JOB NUMBER: T71013 TYPE OF TEST: FCC PART 15

TECHNICIAN: J.SMITH CUSTOMER: RS#8 TEST AREA: OATS 2

| No. | Description | Manufacture | Model | Serial # | WYLE# | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ATTENUATOR | NARDA | 766-20 | 740582 | 01444 | DC-4 GHz | MFG | 3/23/2012 | 3/23/2014 |
| 2 | DMM | FLUKE | 87 | 64440452 | 112518 | MULTI | +0.1%+1 | 5/24/2013 | 6/14/2014 |
| 3 | EMI TEST RCVR | ROHDE SCHWARZ | ESCI | 100338 | 117803 | MULTI | MFG | 4/1/2013 | 4/1/2014 |
| 4 | LISN | SOLAR | 9120T-50-TS-50-N | 1125266 | 01686 | MFG | MFG | 8/7/2012 | 8/7/2014 |
| 5 | LISN | SOLAR | 9120-50-TS-50-N | 1125267 | 01687 | MFG | MFG | 8/7/2012 | 8/7/2014 |
| 6 | TAPE MEASURER | LUFKIN | W606 | 116892 | 116893 | 10meter | ±1mm | 7/12/2011 | 7/12/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 7/30/2013 CHECKED & RECEIVED BY: 7/30/13

Q.A.: 7/30/13

WH-1029A,REV,APR'99

Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 7/29/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG 4.1.2.12 MPT

TECHNICIAN: J.GALBONE CUSTOMER: ES&S TEST AREA: CHAMBER 3

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AMPLIFIER | TECHRON | 7560 | 015075 | 04556 | 600W | 1DB | 7/8/2003 | 7/8/2030 |
| 2 | DMM | FLUKE | 87V | 18990046 | 01474 | 4VDC | +0.1%+1 | 12/5/2012 | 12/6/2013 |
| 3 | METER | HOLADAY | HOL-H03604 | 76286 | 112560 | 30-3KHz | MFG | 5/24/2012 | 2/24/2014 |
| 4 | STOP WATCH | HARHART | STRATOS1 | 110131 | 110131 | 10HR | 5 sec/day | 6/24/2013 | 6/24/2014 |
| 5 | TAPE MEASURER | LUFKIN | W916SCME | NSN | 02705 | 3meters | ±1mm | 4/2/2012 | 4/24/2014 |
| 6 | WAVE GEN | AGILENT | 33250A | SG40007026 | 014181 | MULTI | CERT | 12/18/2012 | 12/28/2013 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 7/29/13 CHECKED & RECEIVED BY: 07/29/2013

Q.A. Brenda Mcnair 7/30/13

WH-102SA,REV.APR'99 Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 7/25/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG SEC.4.1 2.5 RPD

TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: EMI LAB - CHAMBER 5

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | DATALOGGER | PATPCM | 42260 | 9051859 | 06926 | -4°F to 140°F/0- | ±1°F / ±70RH | 5/14/2012 | 5/14/2014 |
| 2 | DMM | FLUKE | 87V | 18250045 | 01474 | 4VDC | ±0.1%rd | 12/6/2012 | 12/6/2013 |
| 3 | POWER SOURCE | CALIFORNIA INST | 1251RP/IF | L06361 | 117347 | 0-270VAC RMS | 1% | 2/20/2013 | 2/20/2014 |
| 4 | TAPE MEASURER | LUFKIN | HV1048CMB | N/SN | 02708 | 8meters | ±1mm | 4/24/2012 | 4/24/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 7/25/13 CHECKED & RECEIVED BY: 07/25/2013

WH-1029A.REV.APR'99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 8/19/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG4.1.2.10 USE: WZ011
TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: EMI CHAMBER#3

| Rec | Description | Manufacturer | Model | Serial # | WYLE # | CAL DUE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AMPLIFIER | AMP RESEARCH | 500W1000A | 25561 | 03141 | 500KHz to 1GHz | NCR | 8/22/2012 | 8/22/2013 |
| 2 | DATALOGGER | EXTECH | 42270 | 9531859 | 04925 | -20 to 1447°F | +1.0°F +0.08RH | 5/14/2013 | 5/14/2014 |
| 3 | DIG OCCUPIED | AMP RESEARCH | DC3010 | 374022 | 117238 | 0.1-1000MHz | 0.5dB | 5/15/2013 | 5/15/2014 |
| 4 | BIOLOGIK PROBE | AMP RESEARCH | T72000 | 11655 | LU1653 | 10 KHz - 1 GHz | 20.1 dB | 11/8/2012 | 11/8/2013 |
| 5 | SIG GEN | AEROFLEX | 3025A | 202356-068 | B30239 | 9kHz TO 2GHz | ATTN | 10/15/2012 | 10/15/2013 |
| 6 | SPECT ANAL | AGILENT | 8564A | US41370108 | 110948 | 44 GHz | CERT | 7/8/2013 | 7/8/2014 |
| 7 | TAPE MEASURER | LUFKIN | W706HACME | 0526 | 03705 | 3meters | 1 mm | 6/24/2013 | 6/24/2014 |

This is to certify that the above instruments were calibrated using state of the art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 8/19/13 CHECKED & RECEIVED BY: 8/19/2013
QA: 8/19/2013

WYLE-IEQSA.REV.APR99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 7/22/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG SECTION 4.4.2.7

TECHNICIAN: J.GALEONE CUSTOMER: ES&S TEST AREA: EMI LAB - CHAMBER 3

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | COUPL NETWK | HARFELY TRENCH | PCD100 | 149889 | R90540 | MFG | MFG | 7/10/2013 | 7/10/2015 |
| 2 | DATALOGGER | EXTECH | 42280 | 9051859 | 04925 | -4°F to 144°F/0- | 4.0°F / 4.5%RH | 5/14/2013 | 5/14/2014 |
| 3 | IMPULSE MODULE | HARFELY TRENCH | PIM100 | 1199 | R90538 | dkV | MFG | 7/10/2013 | 7/10/2015 |
| 4 | OSCILLOSCOPE | TEKTRONIX | DPO5104 | C012091 | 61737 | MFG | MFG | 10/23/2012 | 10/23/2013 |
| 5 | STOP WATCH | HANHART | STRATOS1 | 110131 | 110131 | 10HR | 5 sec/day | 6/24/2013 | 5/24/2014 |
| 6 | SURGE TSTR | HARFELY TRENCH | PSURGE6000 | 150270 | R90537 | MULTI | MFG | 7/10/2013 | 7/10/2015 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 7/22/13 QA: CHECKED & RECEIVED BY: 7/22/13 Brenda Moore 7/22/13

WI-1029A,REV.APR'99

Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 8/23/2013 JOB NUMBER: T71013 TYPE OF TEST: VIBRATION

TECHNICIAN: D. MEDLEY CUSTOMER: ES&S VOTING SYSTEMS TEST AREA: DYNAMICS

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ACCELEROMETER | ENDEVCO | 7704A-50 | 13073 | 02600 | 50 pC/g / 20 Kft | ±5% | 8/14/2013 | 2/14/2014 |
| 2 | ACCELEROMETER | ENDEVCO | 7704A-50 | 12603 | 04857 | 50pC/g | ±5% | 8/14/2013 | 2/14/2014 |
| 3 | CHARGE | ENDEVCO | 2775A | EE24 | 112652 | GAIN | 1.5% | 8/20/2013 | 2/18/2014 |
| 4 | CHARGE | ENDEVCO | 2775A | FD75 | 112653 | GAIN | 1.5% | 8/20/2013 | 2/18/2014 |
| 5 | DMM | FLUKE | 45 | 5095170 | 104267 | MULTI | CERT | 6/25/2013 | 6/25/2014 |
| 6 | DYN SIG | DATA PHYSICS CO | 70499 | 30004048 | 02760 | MULTI | MFG | 9/12/2012 | 9/12/2013 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: CHECKED & RECEIVED BY: 8/23/13

Q.A.: 8/23/13

WH 1029A REV. APR 09

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 8/19/2013 JOB NUMBER: T71013 TYPE OF TEST: TEMP

TECHNICIAN: F TURNER CUSTOMER: ES&S TEST AREA: CHAMBER 16

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | CHART RECORDER | HONEYWELL | DR145AT-111 | 9569YS68006 | 110980 | 32 TO 131°F | 0.5% FS | 8/8/2013 | 8/8/2014 ** |
| 2 | TEMP ALARM | THERMOTRON | THERM-ALARM | n/a | 03339 | TYPE T | ±1°C | 8/8/2013 | 8/8/2014 * |
| 3 | TEMP | THERMOTRON | 4800 | n/a | 03378 | -123-375°F | .25% | 8/8/2013 | 8/8/2014 * |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: Frances Turner 8/19/13 CHECKED & RECEIVED BY: 08/19/2013

Q.A.: 8/19/2013

WI-1029A,REV,APR'99 Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 8/21/2013 JOB NUMBER: T71013.01 TYPE OF TEST: COLD TEMP

TECHNICIAN: T.J.PARCUS CUSTOMER: ES&S TEST AREA: CHAMBER#16

| No | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | CHART RECORDER | HONEYWELL | DR45AE-1111 | 6549Y558906 | 110980 | 32 TO 131°F | 0.5% FS | 8/8/2013 | 8/8/2014 |
| 2 | TEMP ALARM | THERMOTRON | THERM-ALARM | n/a | 03379 | TYPE T | ±1°C | 8/8/2013 | 8/8/2014 |
| 3 | TEMP | THERMOTRON | 4800 | n/a | 03378 | -128.9255 | .25% | 8/8/2013 | 8/8/2014 |

This is to certify that the above instruments were calibrated using state of the art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 8/21/2013 CHECKED & RECEIVED BY: 8/21/13

Q.A.: 8/21/2013

WI-1029A,REV.APR'99 Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 8/7/2013 JOB NUMBER: T71013 TYPE OF TEST: TEMP-HUM

TECHNICIAN: T.J.PARCUS CUSTOMER: ES&S TEST AREA: CHAMBER#2

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | HUMIDITY/TEMP | VAISALA | HMT315 | J1410005 | 61610 | MULTI | M/E | 9/4/2013 | 9/4/2015 |
| 2 | TEMP | THERMOTRON | SE12005 | 28317 | 104758 | -70-180°C | 0.3°C | 3/13/2013 | 3/13/2014 |
| 3 | TEMP RECORDER | HONEYWELL | 5384509A | 9829Y8369920 | 114837 | -184-371°C | 35°C | 3/13/2013 | 3/13/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 8-7-2013 CHECKED & RECEIVED BY: 8/7/2013

Q.A.: 8/7/13

WH-1029A,REV,APR99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 8/26/2013 JOB NUMBER: T71013 TYPE OF TEST: TEMP POWER
TECHNICIAN: LARRY IVEY CUSTOMER: ES&S TEST AREA: ENV CHAMBER 51A

| No. | Description | Manufacture | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | POWER SOURCE | CALIFORNIA INST | 1251RMF | 106361 | 117347 | 0-279VAC RMS | 1% | 2/26/2013 | 2/20/2014 |
| 2 | TEMP | MICRISTAR | 835-R11 | 10935 | 103416 | -450-700°F | 1%FS | 12/5/2012 | 12/5/2013 |
| 3 | TEMP IND | NEWPORT | Q2021TC | N/A | 116533 | TYPE T | ±1.5% | 12/5/2012 | 12/5/2013 |
| 4 | TEMP RECORDER | HONEYWELL | DR430T | 9241R8505000 | 109810 | +200-600°F | 4°F | 12/5/2012 | 12/5/2013 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: Larry Ivey 8/26/13 CHECKED & RECEIVED BY: Michael L Walker 8/26/13

QA: 8/26/13

WH-1029A,RCV,AFR'99

Page 1 of 1

# Appendix F

## FL EVS 4.5.0.0 ExpressVote Test Report

wyle laboratories

Wyle Laboratories, Inc.
7800 Highway 20 West
Huntsville, Alabama 35806
Phone (256) 837-4411 • Fax (256) 721-0144
www.wyle.com

REPORT NO.: T71013.02-01
WYLE JOB NO.: T71013.02
CLIENT P.O. NO.: : EX&S-MSA-TA029
CONTRACT: N/A
TOTAL PAGES (INCLUDING COVER): 128
DATE: November 18, 2013

# TEST REPORT

**HARDWARE COMPLIANCE TESTING**
**OF THE**
**ELECTION SYSTEMS & SOFTWARE**
**FL EVS 4.5.0.0 VOTING SYSTEM**
**EXPRESSVOTE HARDWARE VERSION 1.0**

for

Election Systems & Software, LLC
11208 John Galt Boulevard
Omaha, NE 68137

STATE OF ALABAMA
COUNTY OF MADISON }

Robert Bridges, Director being duly sworn, deposes and says: The information contained in this report is the result of complete and carefully conducted testing and is to the best of his knowledge true and correct in all respects.

SUBSCRIBED and sworn to before me this 19 day of Nov 2013

SEAL Sandra A. Daniel
Notary Public in and for the State of Alabama at Large

My Commission expires June 2, 2015

Wyle shall have no liability for damages of any kind to person or property, including special or consequential damages, resulting from Wyle's providing the services covered by this report.

PREPARED BY: Ryan D. Chambers, Project Engineer 11-19-2013 Date

APPROVED BY: Frank Padilla, Voting Systems Manager 11-19-13 Date

WYLE Q. A.: Rick Davis, Q. A. Manager 11-19-13 Date

NVLAP LAB CODE 200777-0

VSTL

*Revisions*

wyle Laboratories

REVISION Original Release
REPORT NO. T71013.02-01
DATE November 18, 2013

| REV | DATE | PAGE OR PARAGRAPH AFFECTED | DESCRIPTION OF CHANGES |
|---|---|---|---|
| — | 11-18-13 | Entire Document | Original Release |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

Page No.

ATTACHMENTS

## 1.0 INTRODUCTION

### 1.1 Scope

This report documents the test procedures followed and the results obtained from the Environmental and Electrical Testing performed on the Florida Election Voting System (FL EVS) 4.5.0.0 ExpressVote Hardware Revision 1.0 for Election Systems & Software (ES&S). Upon receipt by Wyle Laboratories, the systems were inspected and subjected to a Physical Configuration Audit (PCA). All testing was performed at Wyle Laboratories' Huntsville, Alabama, Test Facility.

### 1.2 Objective

The ES&S FL EVS 4.5.0.0 Voting System was tested in reference to the United States Federal Election Commission (FEC) 2002 Voting System Standards (VSS) and all applicable EAC 2005 Voluntary Voting Systems Guidelines (VVSG).

### 1.3 Test Report Overview

This test report consists of four main sections and attachments:

- 1.0 Introduction – Provides the architecture of the National Certification Test Report (hereafter referred to as Test Report); a brief overview of the testing scope of the Test Report; a list of documentation, customer information, and references applicable to the voting system hardware, software, and this test report.
- 2.0 System Identification and Overview – Provides information about the equipment tested.
- 3.0 Test Background – Contains information about the certification test process and a list of terms and nomenclature pertinent to the Test Report and system tested.
- 4.0 Test Findings and Recommendations – Provides a summary of the results of the testing process.
- Attachments – Information supporting reviews and testing of the voting system are included as attachments to this report.

### 1.4 Customer

Election Systems & Software, LLC
11208 John Galt Boulevard
Omaha, NE 68137

(The remainder of this page intentionally left blank)

1.0 INTRODUCTION (Continued)

1.5 References

The documents listed were utilized to perform certification testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines," and Volume II, Version 1.0, "National Certification Testing Guidelines," dated December 2005
- United States Federal Election Commission Voting System Standards Volume I, "Performance Standards" and Volume II, "Test Standards," dated April 2002
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 1.0, effective date July 2008
- Florida Voting System Standards, Form DS-DE 101, 1-12-05
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)," dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)," dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Wyle Laboratories' Test Guidelines Documents: EMI-001A, "Wyle Laboratories' Test Guidelines for Performing Electromagnetic Interference (EMI) Testing," and EMI-002A, "Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products"
- Wyle Laboratories' Quality Assurance Program Manual, Revision 5
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- EAC Requests for Interpretation (listed on www.eac.gov)
- EAC Notices of Clarification (listed on www.eac.gov)
- MIL-STD-810D, "Environmental Test Methods and Engineering Guidelines," 19 July 1983.
- MIL-STD-498, "Software Development and Documentation Standard," 27 May 1998
- (PCA/FCA) MIL-STD-1521, "
- MIL-STD-882, "Systems Safety Program Requirements".
- MIL-STD-973, "Configuration Management, 30 September 2000.
- MIL-HDBK-454, "Standard General Requirements for Electronics Equipment"

(The remainder of this page intentionally left blank)

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW

### 2.1 System Overview

The ES&S FL EVS 4.5.0.0 Voting System is a new system that contains the ExpressVote hardware version 1.0. The ExpressVote is a voter interface device designed to be used at the polling place. This was a new piece of equipment so a full hardware testing suite was performed at Wyle Laboratories. For the ES&S FL EVS 4.5.0.0 Voting System, Wyle Laboratories subjected the ExpressVote to: non-operating environmental tests, operating environmental tests and Electromagnetic Compatibility (EMC) tests. The ElectionWare EMS was only utilized to generate election media and verify results. Wyle Laboratories only documented the configuration used during testing conducted at Wyle Laboratories.

### 2.2 System Identification

The materials required for testing of the ES&S FL EVS 4.5.0.0 Voting System included software, hardware, test materials, and deliverable materials shipped directly to Wyle Laboratories by ES&S. The materials documented in the following sections are the materials used during Wyle Laboratories' testing of only the ExpressVote and the interface with an optical scanning device and the EMS.

#### 2.2.1 Hardware

This subsection categorizes the equipment the manufacturer submitted for testing and is listed in Table 2-1. Each test element is included in the list of the equipment required for testing of that element, including system hardware, general purpose data processing and communications equipment, and any required test instrumentation.

Table 2-1 ES&S FL EVS 4.5.0.0 Test Equipment

| Equipment | Description | | Serial Numbers |
|---|---|---|---|
| ExpressVote (Hardware Revision 1.0) | Voter Interface Device | | EV01135500029 (EMI) |
| DS200 (Hardware Revision 1.3) | Precinct Count Digital Scanner | | ES00083400507 (Used for Tabulation Only) |
| Voting card Box | Plastic Voting card Box/Plastic Transport Case | | T71013-BB-002 |
| Dell Latitude Laptop | CPU: Intel Core i5-2540M 2.60Ghz<br>RAM: 4.00 GB<br>HDD: 250 GB – ST25OLT007-9ZV14C<br>OS: Windows 7 Professional SP1 – 64 Bit | | 39CMJS1 |
| Transport Media/ Memory Device/ USB Flash Drive | Approved Manufacturer List: Delkin | Approved Capacity List:<br>512 MB<br>1 GB<br>2 GB<br>4 GB<br>8GB | Wyle Laboratories-assigned TM-XXX* |

*Wyle Laboratories uniquely labels each media device with the information (election, results, test utilized for) loaded on the device.

2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

2.2 System Identification (Continued)

2.2.2 Software

The software evaluated was limited to ElectionWare, Election Reporting Manager (ERM), and the firmware build for the ExpressVote. Only the changes incorporated since the EVS 5.0.0.0 test campaign were evaluated by Wyle Laboratories. Wyle Laboratories utilized an EMS setup with new versions of ElectionWare and ERM to load election information onto transport media. Wyle Laboratories did not test the EMS for any other functionality.

Table 2-2 Software Required for Testing

| Software Identification | Version |
|---|---|
| ExpressVote Firmware Version | 1.2.0.0zv/1.2.0.0zzc |

2.3 Test Support Materials

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

The following test materials were required to support the ES&S FL EVS 4.5.0.0 test campaign:

Table 2-3 Test Support Equipment

| Test Material | Quantity |
|---|---|
| 14" ExpressVote Voting card Activation Cards | 4500 |
| 19" ExpressVote Voting card Activation Cards | 200 |

2.4 Vendor Technical Data Package

The Technical Data Package (TDP) contains information about requirements, design, configuration management, quality assurance, and system operations. A sealed version of the TDP was submitted for this campaign due to only Hardware Testing being performed. The table below provides the TDP documents submitted and reviewed for the ES&S FL EVS 4.5.0.0 campaign.

(The remainder of this page intentionally left blank)

2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

2.4 Vendor Technical Data Package (Continued)

Table 2-4 ES&S FL EVS 4.5.0.0 Voting System TDP

| ES&S FL EVS 4.5.0.0 TDP Documents | Version | Doc No. | Document Code |
|---|---|---|---|
| *System Hardware Specification* | | | |
| System Hardware Specification – ExpressVote | 1.0 | 03-10 | ExpressVoteHW_M_SPC_0310_HWSpec |
| *System Test/Verification Specification* | | | |
| System Operations Procedures – ExpressVote | 1.0 | N/A | FLEVS4500_SOP00_ExpressVote |
| *System Maintenance Manuals* | | | |
| System Maintenance Manual – ExpressVote | 1.0 | N/A | FLEVS4500_SMM_ExpressVote |

(The remainder of this page intentionally left blank)

## 3.0 TEST BACKGROUND

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

- ISO-9001:2000
- NVLAP Accredited ISO 17025:2005
- EAC Accredited VSTL, NIST 150,150-22
- A2LA Accredited (Certification No.'s 845.01, 845.02, and 845.03)
- FCC Approved Contractor Test Site (Part 15, 18, 68)

### 3.1 General Information about the Test Process

All testing performed as part of the test effort was performed at the Wyle Laboratories' Huntsville, AL facility. Conformance testing was limited to the ES&S FL EVS 4.5.0.0 Voting System component previously identified in this report.

All hardware used during testing for this test campaign was configured "As Used" for voting. The ES&S FL EVS 4.5.0.0 EMS suite was loaded on a COTS PC. Each ExpressVote was placed on a voting booth and loaded with the proper firmware. Each voting card output from the ExpressVote was input into the DS200 tabulator, or a DS850 to tabulate the results from the ExpressVote. A single DS200 was placed on a voting card box or a DS850 and loaded with the proper firmware for tabulating purposes only. All media used during testing was loaded from the EMS PC. All hardware used to build the ExpressVote firmware was configured by Wyle Laboratories.

### 3.2 Wyle Quality Assurance

All work performed on this program was in accordance with Wyle Laboratories' Quality Assurance Program and Wyle Laboratories' Quality Program Manual, which conforms to the applicable portions of International Standard Organization (ISO) Guide 17025.

The Wyle Laboratories, Huntsville Facility, Quality Management System is registered in compliance with the ISO-9001 International Quality Standard. Registration has been completed by Quality Management Institute (QMI), a Division of Canadian Standards Association (CSA).

### 3.3 Test Equipment and Instrumentation

All instrumentation, measuring, and test equipment used in the performance of this test program was calibrated in accordance with Wyle Laboratories' Quality Assurance Program, which complies with the requirements of ANSI/NCSL 2540-1, ISO 10012-1, and ISO/IEC 17025. 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.

(The remainder of this page intentionally left blank)

3.0 TEST BACKGROUND (Continued)

3.4 Terms and Abbreviations

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

Table 3-1 Terms and Abbreviations

| Term | Abbreviation | Definition |
|---|---|---|
| Americans with Disabilities Act of 1990 | ADA | ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability. |
| Configuration Management | CM | A system engineering process for establishing and maintaining a system's requirements, design and function throughout the life of the system. |
| Commercial Off the Shelf | COTS | Commercial, readily available hardware or software. |
| Direct-Recording Electronic | DRE | A voting system that records votes by means of a voting card display provided with mechanical or electro-optical components that can be activated by the voter; that processes data by means of a computer program; and that records voting data and voting card images in memory components. |
| United States Election Assistance Commission | EAC | Commission created per the Help America Vote Act of 2002 assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems. |
| Election Management System | EMS | — |
| Equipment Under Test | EUT | — |
| Help America Vote Act | HAVA | Act created by United States Congress in 2002. |
| National Institute of Standards and Technology | NIST | Government organization created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhances economic security and improves our quality of life. |
| Physical Configuration Audit | PCA | Review by accredited test laboratory to compare voting system components submitted for certification testing to the manufacturer's technical documentation, and confirmation the documentation meets national certification requirements. A witnessed build of the executable system is performed to ensure the certified release is built from tested components. |
| Quality Assurance | QA | — |
| Technical Data Package | TDP | Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing. |
| Voting System Standards | VSS | Published by the FEC, second iteration of national level voting system standards. |
| Voluntary Voting System Guidelines | 2005 VVSG | Published by the EAC, the third iteration of national level voting system standards. |
| Wyle Laboratories' Operating Procedure | WOP | Wyle Laboratories' Test Method or Test Procedure |

## 4.0 TEST FINDINGS AND RECOMMENDATIONS

The ES&S FL EVS 4.5.0.0 Voting System component, as listed in Section 2.0, was subjected to the tests described in Section 3.2 of this report. The results of those tests are summarized in the sections below. All hard copy data generated by the performance of these tests is retained by Wyle Laboratories as raw data.

### 4.1 System Level Baseline

A System Level Baseline was performed to evaluate the system being submitted for testing in comparison to the system TDP. A Physical Configuration Audit was performed on the ES&S FL EVS 4.5.0.0 submitted for Hardware Testing.

#### 4.1.1 Physical Configuration Audit

A focused Physical Configuration Audit (PCA) of the ES&S FL EVS 4.5.0.0 Voting System was performed in accordance with Section 6.6 of Volume II of the 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 purpose of the PCA is to: establish a configuration baseline (both hardware and software) of the system to be tested; verify that the reviewed source code conforms to the vendor's specification; and assess the adequacy of user acceptance test procedures and data.

The PCA performed on the ES&S FL EVS 4.5.0.0 Voting System consisted of inspecting the ExpressVote scanner, firmware/software, and the TDP used in the ES&S FL EVS 4.5.0.0 Voting System.

**Summary Findings:** A focused PCA was performed to baseline the system's hardware and software components prior to commencement of the test campaign. During the PCA, one anomaly was encountered (reference Notice of Anomaly No. 3 in Attachment A for further reference).

### 4.2 Technical Data Package Review

The ES&S FL EVS 4.5.0.0 Voting System Technical Data Package (TDP) was not reviewed to the 2005 VVSG. The three supplied TDP documents were only utilized as reference material for: the hardware portion of the PCA, EUT configuration and test setup.

**Summary Findings:** A TDP review was not performed.

### 4.3 Hardware Testing

Hardware testing included: the inspection and evaluation of voting system documentation; tests of voting system under conditions simulating the intended storage, operation, and transportation; and operational tests verifying system performance and function under normal and abnormal conditions. Hardware testing was limited to the ES&S FL EVS 4.5.0.0 Voting System. Hardware Testing Data can be located in Attachments A through G of this document for additional information.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.3 Hardware Testing (Continued)

The ExpressVote was subjected to hardware tests as summarized in Table 4-1.

Table 4-1 Test Program Requirements

| Report Section | VVSG Vol. I Section | VVSG Vol. II Section | Test Description |
|---|---|---|---|
| 4.5.1 | 4.1.2.14 (a) | 4.6.4 | Low Temperature Test |
| 4.5.1 | 4.1.2.14 (a) | 4.6.5 | High Temperature Test |
| 4.5.1 | 4.1.2.14 (c) | 4.6.3 | Vibration Test |
| 4.5.1 | 4.1.2.14 (b) | 4.6.2 | Bench Handling Test |
| 4.5.1 | 4.1.2.14 (d) | 4.6.6 | Humidity Test |
| 4.5.2 | 4.1.2.13 | 4.7.1 | Temperature and Power Variation Test |
| 4.6.1 | 4.1.2.5 | 4.8 | Electrical Power Disturbance Test |
| 4.6.2 | 4.1.2.9 | 4.8 | Electromagnetic Radiation Test |
| 4.6.3 | 4.1.2.8 | 4.8 | Electrostatic Disruption Test |
| 4.6.4 | 4.1.2.10 | 4.8 | Electromagnetic Susceptibility Test |
| 4.6.5 | 4.1.2.6 (a) | 4.8 | Electrical Fast Transient Test |
| 4.6.6 | 4.1.2.7 (a) (b) | 4.8 | Lightning Surge Test |
| 4.6.7 | 4.1.2.11 (a) | 4.8 | Conducted RF Immunity Test |
| 4.6.8 | 4.1.2.12 | 4.8 | Magnetic Fields Immunity Test |
| 4.6.9 | 4.3.8 | 2.2.2 | Product Safety Review, UL60950-1 |

4.4 Environmental Tests

Environmental tests were performed to ensure that the EUT and associated machine resident firmware were in compliance with the VVSG.

During test performance, the EUT was configured as it would be for use in an election precinct.

4.4.1 Non-Operating Environmental Tests

The EUT was subjected to various Non-Operating Environmental Tests. Prior to and immediately following each test environment, the EUT was powered on and subjected to operability functional checks to verify continued proper operation. The EUT was not powered on during the performance of any of the non-operating tests.

Low Temperature Test

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

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 Environmental Tests (Continued)

4.4.1 Non Operating Environmental Tests (Continued)

Prior to test initiation, the EUT was subjected to a baseline operability checkout to verify system readiness. The EUT was then placed in an environmental test chamber and the chamber temperature was lowered to -4°F and allowed to stabilize. Upon temperature stabilization, the temperature was maintained for an additional four hours. The temperature was then returned to standard laboratory ambient conditions at a rate not exceeding 10°F per minute.

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT successfully completed the requirements of the Low Temperature Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

**High Temperature Test**

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

Prior to test initiation, the EUT was subjected to a baseline operability checkout to verify system readiness. The EUT was then placed in an environmental test chamber and the chamber temperature was raised to 140°F and allowed to stabilize. Upon temperature stabilization, the temperature was maintained for an additional four hours. The temperature was then returned to standard laboratory ambient conditions at a rate not exceeding 10°F per minute.

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT successfully completed the requirements of the High Temperature Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

**Vibration Test**

The EUT was subjected to a Vibration Test in accordance with section 4.6.3 of Volume II of the VVSG. The purpose of this test is to simulate stresses faced during transport of voting machines and voting card counters between storage locations and polling places. This test is equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier.

Prior to test initiation, the EUT was subjected to a baseline operability checkout to verify system readiness. Upon completion, the EUT was secured to an electro dynamics shaker. One control accelerometer was affixed to the shaker table. The EUT was subjected to the Basic Transportation, Common Carrier profile as depicted in MIL-STD-810D, Method 514.3, Category 1, with a frequency range from 10 to 500 Hz and an overall rms level of 1.04, 0.74, and 0.20 G for durations of 30 minutes in each orthogonal axis.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 Environmental Tests (Continued)

4.4.1 Non-Operating Environmental Tests (Continued)

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The ExpressVote successfully completed the requirements of the Vibration Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

Bench Handling Test

The EUT was subjected to a Bench Handling Test in reference with section 4.6.2 of Volume II of the VVSG. The purpose of this test is to simulate stresses faced during maintenance and repair of voting machines and voting card counters. This test is equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI.

Prior to performance of the test, the EUT was subjected to a baseline operability checkout. Following the checkout, the EUT was inserted into the carrying case, and each edge of the base of the machine was raised to a height of four inches above the surface and allowed to drop freely onto the ground. This was performed six times per edge, for a total of 24 drops.

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT successfully completed the requirements of the Bench Handling Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

Humidity Test

The EUT was subjected to a Humidity Test in accordance with section 4.6.6 of Volume II of the VVSG. The purpose of the test was to simulate stresses encountered during storage of voting machines and voting card counters. This test is similar to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid.

The EUT was subjected to a baseline operability checkout to verify system readiness. Upon completion, the EUT was placed in an environmental test chamber and was subjected to a 10-day humidity cycle in accordance with the 24-hour cycle values as shown in Table 4-2.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 Environmental Tests (Continued)

4.4.1 Non Operating Environmental Tests (Continued)

Table 4-2 Humidity Test Cycle Values

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

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT successfully completed the requirements of the Humidity Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, C, and G of this report.

Florida Sand and Dust Exposure Test

All systems and components that are to be transported from place to place within a normal cycle of use, such as precinct tabulation equipment, will meet the requirements of this test. This test was similar to the procedure of the MIL-STD-810D, Method 510.2, Procedure I, Blowing Dust. This test was intended to evaluate the ability of the equipment to survive exposure to Dust and Fine Sand that may penetrate into cracks crevices, switches, display surfaces, and Electromechanical parts. The equipment was in a non-operating, stowed configuration, and protective covers were in place as the system configuration included one.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 Environmental Tests (Continued)

4.4.1 Non-Operating Environmental Tests (Continued)

Table 4-3 Procedure Florida Sand and Dust Exposure Test

| | |
|---|---|
| Step No. 1 | Arrange the system for normal operation. |
| Step No. 2 | Turn on power, and allow the system to reach design-operating temperature. |
| Step No. 3 | Perform any servicing and make any adjustments necessary to achieve operational status. |
| Step No. 4 | Operate the equipment in all modes, demonstrating all functions and features that would be utilized during election operations. |
| Step No. 5 | Verify that all system functions have been correctly executed. |
| Step No. 6 | Install the equipment in a test facility that meets the requirements of MIL-STD-810D, Method 510.2, Section II, and Subsection II-1.1.1. |
| Step No. 7 | Adjust the test section temperature to 23 degrees C. (73 degrees F.) and the relative humidity to less than 30 percent. Maintain this relative humidity throughout the remainder of the test. |
| Step No. 8 | Adjust the air velocity to 1.5 meters per second (300 feet per minute). |
| Step No. 9 | Adjust the dust feed control for a dust concentration of 10.6 ± 7 grams per cubic meter (0.3 ± 0.2 grams per cubic foot). |
| Step No. 10 | Maintain the conditions of Steps 2 through 4 for at least 6 hours. |
| Step No. 11 | Stop the dust feed and increase the test section air temperature to 32 degrees C. (90 degrees F.). Maintain this condition until the internal temperature of the equipment has stabilized. |
| Step No. 12 | Adjust the air velocity as in Step 3. Restart the dust feed to maintain the dust concentration as in Step 4. |
| Step No. 13 | Continue the exposure for at least 6 hours. |
| Step No. 14 | Turn off all chamber controls and allow the equipment to return to room temperature. |
| Step No. 15 | Remove accumulated dust from the equipment by brushing, wiping, or shaking, taking care to avoid introducing additional dust into the equipment. Do not remove dust by air blast or vacuum cleaning. |
| Step No. 16 | Inspect the interior of the equipment for evidence of dust intrusion and damage. |
| Step No. 17 | Arrange the system for normal operation. |
| Step No. 18 | Turn on power, and allow the system to reach design-operating temperature. |
| Step No. 19 | Perform any servicing and make any adjustments necessary to achieve operational status. |
| Step No. 20 | Operate the equipment in all modes, demonstrating all functions and features that would be utilized during election operations. |
| Step No. 21 | Verify that all system functions have been correctly executed. |

Summary of Findings: Despite the exterior of the carrying case showing some wear as an effect of the dust test, no dust was noted in the carrying case except what resulted from opening up the carrying case. The carrying case and plastic bag alone seemed to isolate the EUT from the dust. The plastic bag appears untouched except for the small amount of dust that fell into the carrying case during opening. No dust appeared to reach the EUT. The EUT operated as expected after being removed from the packaging.

The EUT successfully completed the requirements of the Florida Sand and Dust Exposure Test. Photographs and Test Data Sheets are contained in Attachments B and C of this report.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 Environmental Tests (Continued)

4.4.1 Non-Operating Environmental Tests (Continued)

Florida Rain Exposure Test

All systems and components which are designed to be transported from place to place within a normal cycle of use, such as precinct tabulation equipment, met the requirements of this test to evaluate the ability of the equipment to survive exposure to falling water from condensation, to leakage from upper surfaces, and to rain for a brief period of time incidental to transportation between a storage facility or polling place and a covered vehicle.

This test was similar to the procedure of MIL-STD-810D, Method 506.2, Procedure II – Drip. The equipment was in a non-operating, transportable configuration, and protective covers were in place as the system configuration included one.

Table 4-4 Procedure Florida Rain Exposure Test

| | |
|---|---|
| Step No. 1 | Arrange the system for normal operation. |
| Step No. 2 | Turn on power, and allow the system to reach design-operating temperature. |
| Step No. 3 | Perform any servicing and make any adjustments necessary to achieve operational status. |
| Step No. 4 | Operate the equipment in all modes, demonstrating all functions and features that would be utilized during election operations. |
| Step No. 5 | Verify that all system functions have been correctly executed. |
| Step No. 6 | Install the equipment in the test facility. Provide a means of dispensing water at a rate of 7 gallons per square foot per hour, as illustrated in MIL-STD-810D, Figure 506.2-1. |
| Step No. 7 | Subject the equipment to water falling from a height of approximately 3 feet for a period of 15 minutes. |
| Step No. 8 | At the conclusion of the 15-minute exposure, remove the equipment from the test facility. Open or remove panels as necessary to allow the interior to be inspected. |
| Step No. 9 | Inspect the test item for evidence of water intrusion. |
| Step No. 10 | Arrange the system for normal operation. |
| Step No. 11 | Turn on power, and allow the system to reach design-operating temperature. |
| Step No. 12 | Perform any servicing and make any adjustments necessary to achieve operational status. |
| Step No. 13 | Operate the equipment in all modes, demonstrating all functions and features that would be utilized during election operations. |
| Step No. 14 | Verify that all system functions have been correctly executed. |

Summary of Findings: Despite the exterior of the carrying case showing some wear as an effect of the rain test, no water was noted in the carrying case except what resulted from opening the carrying case. The carrying case and plastic bag alone seemed to isolate the EUT from the water. The plastic bag appeared untouched except for the small amount of water that fell into the carrying case during opening. No water appeared to reach the EUT. The EUT operated as expected after being removed from the packaging.

The EUT successfully completed the requirements of the Florida Rain Exposure Test. The Test Photographs are contained in Attachments B this report.

**4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)**

**4.4 Environmental Tests (Continued)**

**4.4.2 Operating Environmental Tests**

**Temperature/Power Variation Test**

The ExpressVote was subjected to a Temperature and Power Variation Test in accordance with section 4.7.1 of Volume II of the VVSG. The purpose of this test was to evaluate system operation under various environmental conditions. The cumulative duration of at least 163 hours was achieved by utilizing three units for a period of 64 hours based on the (EAC RFI 2008-01), with 48 hours in the environmental test chamber. For the remaining hours, the equipment was operated at room temperature. This test is similar to the low temperature and high temperature tests of MIL-STD-810-D, Method 502.2 and Method 501.2.

To perform the test, the EUT was placed inside an environmental walk-in test chamber and connected to a variable voltage power source. The temperature inside the chamber and the voltage supplied to the hardware varied from 50°F to 95°F and from 105 VAC to 129 VAC (as depicted in Figures 4-1 through 4-4). During test performance, the operational functions were continuously exercised by the scanning of voting cards.

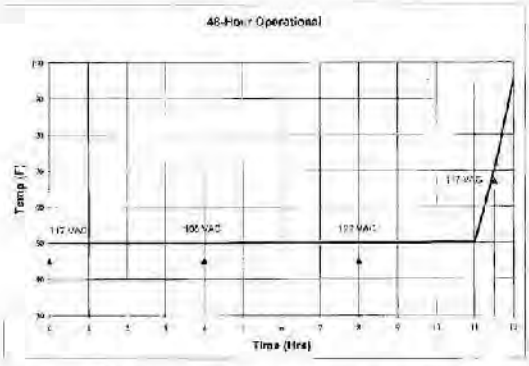



**Figure 4-1 Temperature/Power Variation Profile Hours 0-12**

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 Environmental Tests (Continued)

4.4.2 Operating Environmental Tests (Continued)

Temperature/Power Variation Test (Continued)

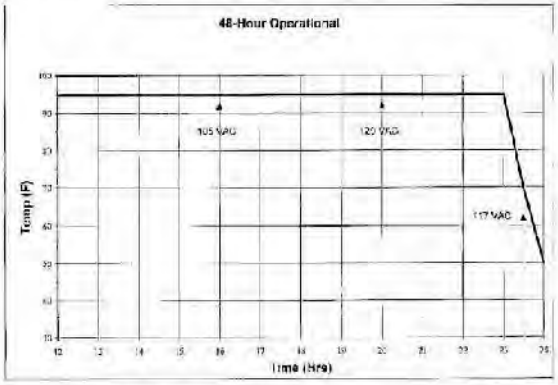



Figure 4-2 Temperature/Power Variation Profile Hours 12-24

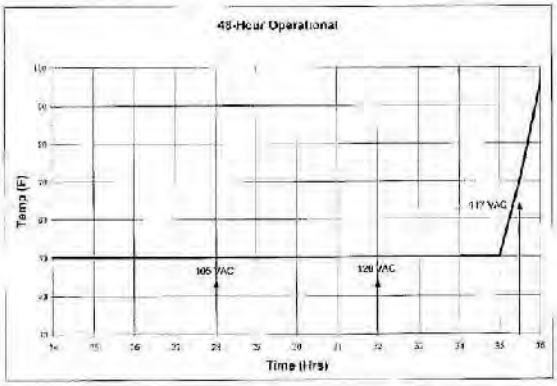



Figure 4-3 Temperature/Power Variation Profile Hours 24-36

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4.2 Operating Environmental Tests (Continued)

Temperature/Power Variation Test (Continued)

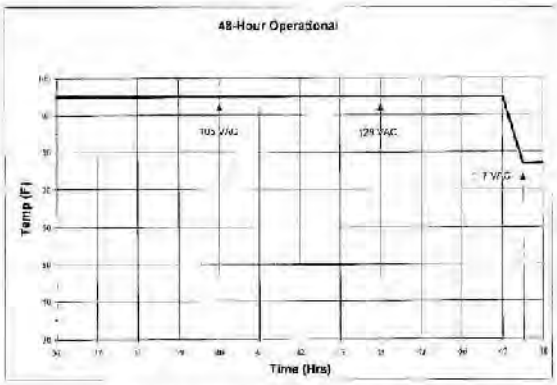



Figure 4-4 Temperature/Power Variation Profile Hours 36-48

Temperature/Power Variation Test (Continued)

**Summary of Findings:** During the Temperature/Power Variation Test, there were two anomalies encountered (reference Notice of Anomaly Nos. 3 and 4 in Attachment A for further reference).

The EUT successfully met the requirements of the Temperature/Power Variation Test on the third attempt. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, E, and G of this report.

4.5 Electrical Tests

Electrical tests were performed to ensure that the EUT and associated machine resident firmware were in compliance with the VVSG. Prior to each electrical test, an operation status check was performed.

During test performance, the EUT was configured as it would be for use in an election precinct.

The EUT was subjected to various electrical tests to ensure continued system operation and reliability in the presence of abnormal electrical events. The EUT was powered and actively processing voting cards during all electrical tests.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.1 Electrical Power Disturbance

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

The EUT was configured to run in an automated test mode, where continual voting card processing would occur during the testing, and subjected to the voltage dips and surges over periods ranging from 20ms to four hours.

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT successfully met the requirements of the Electrical Power Disturbance Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.2 Electromagnetic Radiation Test (FCC Part 15 Class B - Emissions)

Electromagnetic Radiation emissions measurements were performed in accordance with Sections 4.1.2.9 of Volume I and 4.8 of Volume II of the VVSG. This testing was performed to ensure that emissions emanating from the unit do not exceed the limits of 47 CFR Part 15, Subpart B, Class B Limits.

The EUT was configured to run in an automated test mode, where continual voting card processing would occur during the testing. The ExpressVote was subjected to the test requirements detailed in Table 4-5.

Table 4-5 Conducted and Radiated Emissions Requirements

| Conducted Emissions | | | Radiated Emissions | |
|---|---|---|---|---|
| Frequency Range (MHz) | Limits (dBuV) | | Frequency Range (MHz) | 3 Meter Test Limit (dBuV) |
| | Quasi-peak | 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 |

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.2 Electromagnetic Radiation Test (FCC Part 15 Class B Emissions) (Continued)

Testing was performed at the Wyle Laboratories' Open Air Test Site 2 (OATS-2) located on the Intergraph Complex in Huntsville, AL. The OATS-2 is fully described in reports provided to the Federal Communication Commission (FCC) (FCC Reference 98597). The site was tested and complies with the requirements of ANSI C63.4-2003.

To perform the Conducted Emissions portion of the test, the ExpressVote was set up as depicted in Figure 4-5.

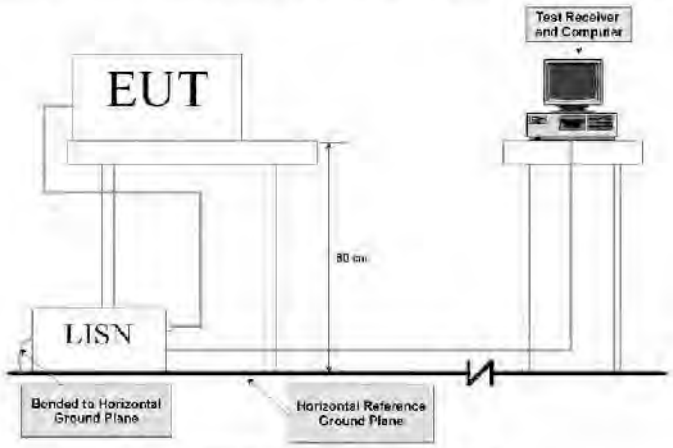



Figure 4-5 Conducted Emissions Test Setup

The ExpressVote was then subjected to the following test procedure:

1. The ExpressVote was placed on a non-metallic table 0.8 meters above the turntable and reference ground plane at the Open-Area Test Site.

2. The ExpressVote AC/DC Power Adapter was connected to the power mains through a Line Impedance Stabilization Network (LISN). Other support units were connected to the power mains through another LISN. The LISN provided 50 ohm/50 µH of coupling impedance for the measuring instrument.

3. The ExpressVote was placed in an active state and monitored for functionality throughout testing.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.2 Electromagnetic Radiation Test (FCC Part 15 Class B Emissions) (Continued)

4. Both Line and Neutral of the power mains connected to the ExpressVote were checked for maximum conducted interference.

5. The frequency range from 150 kHz to 30 MHz was evaluated and recorded. Emissions levels below –20 dB were not recorded.

To perform the Radiated Emissions portion of the test, the ExpressVote was set up as depicted in Figure 4-6.

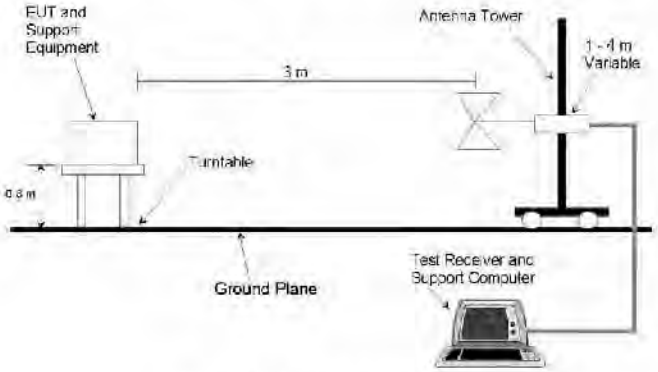



Figure 4-6 Radiated Emissions Test Setup

The ExpressVote was then subjected to the following test procedure:

1. The ExpressVote was placed on a non-metallic turn-table 0.8 meters above the reference ground plane at the Open-Area Test Site.

2. The ExpressVote was placed 3 meters away from the interference-receiving antenna, which was mounted on a variable-height antenna tower. The interference-receiving antenna used was a broadband antenna.

3. For each suspected emissions point, the ExpressVote was arranged in a worst case configuration. The table was rotated from 0 to 360 degrees and the antenna height was varied from one (1) to four (4) meters to identify the maximum reading.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.2 Electromagnetic Radiation Test (FCC Part 15 Class B Emissions) (Continued)

4. All emissions points identified within 20 dB of the specified limit were tested individually using the quasi-peak method as specified and then reported in the tabular data.

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT was found to comply with the required emissions limits. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.3 Electrostatic Disruption

Electrostatic Disruption testing was performed in accordance with Sections 4.1.2.8 of Volume I and 4.8 of Volume II of the VVSG to ensure that should an electrostatic discharge event occur during equipment setup and/or voting card processing, the EUT would continue to operate normally. A momentary interruption is allowed so long as normal operation is resumed without human intervention or loss of data.

The EUT was configured to run in an automated test mode, where continual voting card processing would occur during the testing without operator intervention. The EUT was then subjected to electrostatic discharges of +/- 8 kV contact and +/- 15 kV air as shown in Table 4-6. Discharges were performed at areas typical of those which might be touched during normal operation, including the touch screen, user buttons, and other likely points of contact. The ExpressVote was then setup per the following conditions:

1. Power lines and power line returns were configured as required by the system configuration.
2. The EUT was raised approximately 10 cm from the ground using isolated stand-offs.
3. Signal/control test cables were positioned approximately 5 cm (2 in.) above the ground.

Table 4-6 Electrostatic Discharge Transients

| | Requirements | | |
|---|---|---|---|
| Characteristic | Capacitance | Resistance | Value |
| Pulse Wave Shape (RC Network) | 150 | 330 | pf / Ω |
| Test Levels | Discharge Types | | Value |
| | Air Gap | Direct Contact | |
| | ±15 | ±8 | KV |
| Rise Time | ≤1 | | nanosecond |
| Pulse Decay Time | ≈30 at 50% height | | nanosecond |

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.3 Electrostatic Disruption (Continued)

Table 4-6 Electrostatic Discharge Transients (Continued)

| | Requirements | | |
|---|---|---|---|
| Characteristic | Capacitance | Resistance | Value |
| Pulse Repetition | ≥1 | | per second |
| Total Injected Pulse at each Test Point | 10 | | per polarity (+) |
| Temperature | ≥15 to ≤35 | | °C |
| Relative Humidity | ≥30 to ≤60 | | % |

**Summary of Findings:** During the ESD Test, there were two anomalies encountered (reference Notice of Anomaly Nos. 1 and 2 in Attachment A for further reference).

After the third attempt, the EUT successfully met the requirements of the ESD Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.4 Electromagnetic Susceptibility

Electromagnetic Susceptibility testing was performed in accordance with sections 4.1.2.10 of Volume I and 4.8 of Volume II 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 EUT was configured to run in an automated test mode, where continual voting card processing would occur during the testing without operator intervention. The ExpressVote was then subjected to ambient electromagnetic fields at 10 V/m over a range of 80 MHz to 1000 MHz, as shown in Figure 4-7. 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.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.4 Electromagnetic Susceptibility (Continued)

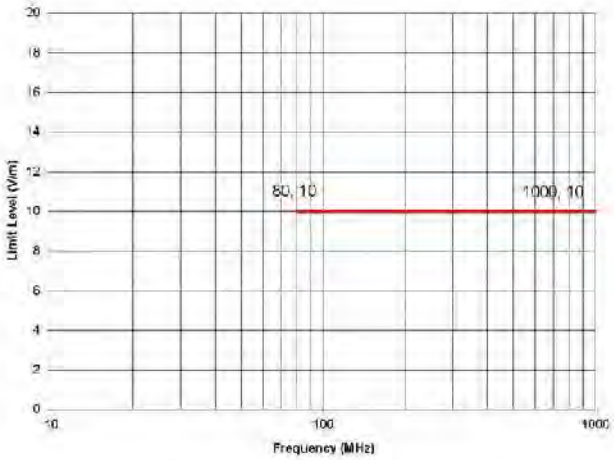



Figure 4-7 Radiated Susceptibility Limit

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

During the Susceptibility Test, the EUT successfully met the requirements of the Electromagnetic Susceptibility Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.5 Electrical Fast Transients

Electrical Fast Transients (EFT) testing was performed in accordance with Sections 4.1.2.6 (a) of Volume I and 4.8 of Volume II of the 2005 VVSG 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 of loss of data. Section 4.1.2.6 (b) of Volume I is not applicable because there are no I/O lines greater than three meters.

The EUT was configured to run in an automated test mode, where continual voting card processing would occur during the testing without operator intervention. The EUT was then subjected to electrostatic fast transients of 2 kV applied to its AC power lines. The pulse characteristics are listed in Table 4-7.

Table 4-7 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 | N/A |
| Burst Duration | 15 | milliseconds |
| Burst Period | 300 | milliseconds |
| Test Duration | 60 | seconds |

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

There was no loss of normal operation or loss of data as a result of the applied transients. The EUT successfully met the requirements of the Electrical Fast Transients Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.6 Lightning Surge

Lightning Surge testing was performed in accordance with Sections 4.1.2.7 (a), (b) of Volume I and 4.8 of Volume II of the 2005 VVSG to ensure that, should a surge event occur on a power line due to a lightning strike, the EUT will continue to operate without disruption of normal operation or loss of data. Sections 4.1.2.7 (c), (d), and (e) are not applicable because there are no DC lines greater than 10 meters and no I/O lines greater than 30 meters.

The EUT was configured to run in an automated test mode, where continual voting card processing would occur during the testing. The EUT power input lines were then subjected to a lightning surge test level of 2 kV applied to its AC power line per the surge characteristics listed in Table 4-8.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.6 Lightning Surge (Continued)

Table 4-8 Surge Characteristics

| Test I.D. | Cable Type | Number of Interfacing Cables | Description | Injection Signals Summary Characteristics |
|---|---|---|---|---|
| Surge | Line (L) to Neutral (N) | 1 | 120 VAC Power Lines | Injection at Power Input. Sinewave: 0°, 90°, and 270° Combination Wave Test Levels: ±2.0 kV and Ring Wave Test Level = ±2.0 kV |
| | Line (L) to Ground (G) | 1 | | |
| | Neutral (N) to Ground (G) | 1 | | |
| | Line (L) & Neutral (N) to Ground (G) | 1 | | |

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT successfully met the requirements of the Lightning Surge Test. Photographs, The Test Data Sheet, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.5.7 Conducted RF Immunity

Conducted RF Immunity testing was performed in accordance with Sections 4.1.2.11 (a) of Volume I and 4.8 of Volume II of the 2008 VVSG. Section 4.1.2.11 (b) of Volume I is not applicable because there are no 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 EUT was configured to run in an automated test mode, where continual voting card processing would occur during the testing without operator intervention. The EUT was then subjected to conducted RF energy of 10 V rms applied to its power lines over a frequency range of 150 kHz to 80 MHz.

Summary of Findings: Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

There was no loss of normal operation or loss of data as a result of the applied conducted RF energy. The EUT successfully met the requirements of the Conducted RF Immunity Test. Photographs, Test Data Sheets, Photographs, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.5 Electrical Tests (Continued)

4.5.8 Magnetic Fields Immunity

Magnetic Fields Immunity testing was performed in accordance with Sections 4.1.2.12 of Volume I and 4.8 of Volume II of the 2005 VVSG. This testing was performed to ensure that the EUT was able to withstand AC magnetic fields without disruption of normal operation of loss of data.

The EUT was configured to run in an automated test mode, where continual voting card processing would occur during the testing. The EUT was then subjected to AC magnetic fields of 30 A/m at a 60 Hz power line frequency.

**Summary of Findings:** Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. None were observed. The EUT was subjected to a post-test operability checkout and continued operability verified.

The EUT successfully met the requirements of the Magnetic Fields Immunity Test. Photographs, Test Data Sheets, and Instrumentation Equipment Sheet are contained in Attachments B, D, and G of this report.

4.6 Product Safety Review

The VVSG states that all voting systems shall meet the following requirements for safety:

1. All voting systems and their components shall be designed to eliminate hazards to personnel or to the equipment itself.
2. Defects in design and construction that can result in personal injury or equipment damage must be detected and corrected before voting systems and components are placed into service.
3. Equipment design for personnel safety shall be equal to or better than the appropriate requirements of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Part 1910.

To satisfy these requirements, the EUT was subjected to a Product Safety Review in accordance with the applicable requirements of UL Standard for Safety for Information Technology Equipment, UL 60950-1, Second Edition.

Non-performance evaluation of the accompanying documentation and unit construction were also performed. No anomalies were discovered during these evaluations.

**Summary of Findings:** The EUT was found to be in compliance with the applicable requirements of the Standard for Safety for Information Technology Equipment UL 60950-1, 2nd Edition. The Product Safety Certificate of Conformance is contained in Attachments F of this report.

(The remainder of this page intentionally left blank)

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.7 Anomalies and Resolutions

Three Notices of Anomalies were issued during the test campaign. A Notice of Anomaly (NOA) is generated upon occurrence of a verified failure, an unexpected test result, or any significant unsatisfactory condition. The Notices of Anomaly generated during testing are presented in their entirety in Attachment A and are summarized below:

Notice of Anomaly No. 1: Electrostatic Disruption
Wyle engineers applied -15 kV air discharge to the bottom-right corner of the EUT, on the inside of the recessed handle. It was observed that the ExpressVote had become completely unresponsive and required human intervention, by means of a system reboot, to regain normal operation. The following onscreen observation was made, the count began to cycle up by approximately 30 counts within approximately five seconds, at which time the following error was displayed on the screen: *"System Error; ExpressVote General Error; Audio Playback Thread encountered and error. Please contact election official. An error has occurred. Power off and contact a technician for repair."* It was also observed that there was no audio output.

Notice of Anomaly No. 2: Electrostatic Disruption
Wyle engineers applied +8 kV contact discharge to the back of the EUT, on the metal plate for which the AC power adapter connection is established. It was observed that the ExpressVote had become completely unresponsive and required human intervention, by means of a system reboot, to regain normal operation. The following onscreen observation was made, the count stopped incrementing and audio was immediately lost. The EUT was observed for an additional seven minutes whereby the shoeshine mode continued to cycle, however the count was not incremented. After seven minutes the EUT began to cycle up by approximately 30 counts within approximately five seconds, at which time the following error was displayed on the screen: *"System Error; ExpressVote UI Application Error. Missing audio file: Prompt_1_98.wav. Please contact election official. An error has occurred. Power off and contact a technician for repair."* After rebooting the EUT, the same test point was subjected to +8 kV contact discharge, at which time this issue was replicated.

Resolution to Notice of Anomaly Nos. 1 & 2
ES&S acknowledged the nonconformance observation. Root cause analysis provided by ES&S documented that power cord was missing earth ground path. This cord was replaced by ES&S and testing was restarted.

Notice of Anomaly No. 3: Temperature/Power Variation Test
During the 22nd hour of testing, Wyle observed that ExpressVote, serial number, EVO113350022, began to operate at a slower rate. During the 24th hour of testing, Wyle observed that ExpressVote, serial number, EVO113350025 began to operate at a slower rate. During the 24th hour of testing, Wyle observed that ExpressVote, serial number, EVO113350025 ceased to be fully functional, the audio stopped working. At this time, the test was halted.

Resolution to Notice of Anomaly No. 3
ES&S acknowledged the nonconformance observation. Root cause analysis provided by ES&S documented the audio playback code was being accessed by multiple threads; and was set to "below normal" priority. This caused audio playback corruption and audio thread to enter into a continuous loop and consuming nearly 100% CPU processing. The audio playback code has been synchronized to prevent threading corruption, and the audio playlist thread priority has been set to "Normal". Testing was restarted after code corrections and build.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.7 Anomalies and Resolutions (Continued)

Notice of Anomaly No. 4: Temperature/Power Variation Test

During testing Wyle engineers observed that ExpressVote, serial numbers EVO113350022 and EVO113350023, printed a card with data missing in a vertical line across the length of the ballot. The tabulator would not read the card. All races and candidates were present and correct on the card, but the test was halted because the card would not scan.

Resolution to Notice of Anomaly No. 4

The printer platen had become dirty. A buildup of material on the printer platen interfered with the heat transfer from the printer platen to the vote summary card. Through cleaning of the printer platen every 12 hours of operation or before each election will eliminate this issue.

4.8 Test Summary and Conclusion

Wyle Laboratories performed hardware compliance testing on all modifications submitted for the ES&S FL EVS 4.5.0.0 Voting System. Wyle Laboratories only performed hardware compliance testing on the ExpressVote. The ExpressVote met the applicable hardware requirements of this test campaign to the EAC 2005 VVSG.

**This report is valid only for the system identified in Section 2 of this report. Any changes, revisions, or corrections made to the system after this evaluation shall be submitted to Wyle Laboratories to determine the scope of testing for the modified system. The scope of testing required will be determined based upon the degree of modification.**

ATTACHMENT A

NOTICES OF ANOMALY

wyle laboratories

| NOTICE OF ANOMALY | | DATE: 10/07/2013 |
|---|---|---|
| NOTICE NO: 1 | P.O. NUMBER: ES&S-ASA-TA029 | CONTACT NO: N/A |
| CUSTOMER: Election Systems and Software (ES&S) | | WYLE JOB NO: T71013.01 |
| NOTIFICATION MADE TO: Mike Connaway | | NOTIFICATION DATE: 09/26/2013 |
| NOTIFICATION MADE BY: Ryan Chambers | | VIA: Telephone |
| CATEGORY: [X] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT | | DATE OF ANOMALY: 09/26/2013 |
| PART NAME: EL EVS 4.5.C.C | | PART NO: — |
| TEST: Electrostatic Discharge (ESD) | | I.D. NO: EV01123050/29 |
| SPECIFICATION: EAC 2005 VVSG, Volume I | | PARA. NO: Section 4.1.2.8 |

REQUIREMENTS:

Vote scanning and counting equipment for paper-based systems, and ... 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 interruptions as long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and committed to the voter.

DESCRIPTION OF ANOMALY:

Wyle engineers applied -15 kV air discharge to the [illegible] of the EUT, on the inside of the recessed [illegible]. It was observed that the ExpressVote had become completely unresponsive and required human intervention, by means of a system reboot, to regain normal operation. The following anomaly observation was made, the touch began to cycle up by approximately 30 points within approximately five seconds, at which time the following error was displayed on the screen: *System Error ExpressVote General Error Audio Physical Threat encountered and error. Please contact election official. An error has occurred. Power off and contact a technician for repair.*" It was also observed that there was no audio output.

DISPOSITION + COMMENTS + RECOMMENDATIONS:

The final disposition is pending as test commentary is not presented by the client.

Safety Hazard: [ ] YES [X] NO Procedure OFP Part 21: [ ] YES [ ] NO [X] N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: [ ] CUSTOMER [ ] WYLE

CAR Required: [ ] YES [X] NO CAR No:

VERIFICATION:

TEST WITNESS: N/A

REPRESENTING: N/A

QUALITY ASSURANCE: [illegible]

PROJECT ENGINEER: [illegible]

PROJECT MANAGER: [illegible]

INTER-DEPARTMENTAL COORDINATION: N/A

WYLE [illegible], Rev. March '09

Page 1 of 1

CONTROLLED DOCUMENT

wyle Laboratories

| NOTICE OF ANOMALY | | DATE: 10/01/2013 |
|---|---|---|
| NOTICE NO: 2 | P.O. NUMBER: ESAS-MSA-TA020 | CONTRACT NO: N/A |
| CUSTOMER: Electron Systems and Software (ES&S) | | WYLE JOB NO: T71013.02 |
| NOTIFICATION MADE TO: Mike Dennison | | NOTIFICATION DATE: 09/26/2013 |
| NOTIFICATION MADE BY: Sean O'Connor | | VIA: Discussion |
| CATEGORY: [X] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT | | DATE OF ANOMALY: 09/26/2013 |
| PART NAME: [illegible] | | MAKE NO. |
| TEST: Electrostatic Discharge (ESD) | | I.D. NO. EV01123502J |
| SPECIFICATION: UAC 3005 VVHO, Volume I | | PARA. NO. Section 4.1.2.8 |

**REQUIREMENTS:**

Voter scanning and counting equipment, for paper-based systems, and all DRE equipment, shall be able to withstand 15 kV air discharges and 8 kV contact discharges 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 by the voter.

**DESCRIPTION OF ANOMALY:**

Wyle engineers applied 8 kV contact discharge to the back of the EUT on the metal plate for which the AC power adapter connection is established. It was observed that the ExpressVote had become completely unresponsive and required human intervention, by means of a system reboot, to regain normal operation. The following anomaly observation was made, the count stopped incrementing and audio was immediately lost. The EUT was observed for an additional seven minutes whereby the cross-use needs continued to cycle, however the count was not incremented. After seven minutes the EUT began to cycle up by approximately 30 counts within approximately five seconds, at which time the following error was displayed on the screen: *"System Error Occurred On Application Event, Missing audio file. Prompt 1.WAV. Please contact election official. An error has occurred. Power off and contact technician for repair."* After rebooting the EUT, the same test point was subjected to 15 kV air discharge, at which time this issue was replicated.

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**

The final disposition is pending root cause analysis to be conducted by the client.

Safety Potential: [ ] YES [X] NO Report(s) to OSR: [ ] YES [ ] NO [X] N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: [ ] CUSTOMER [ ] WYLE

CAR Required: [ ] YES [X] NO CAR No.

VERIFICATION:

TEST WITNESS: N/A

REPRESENTING: N/A

QUALITY ASSURANCE: Rhonda Davis Noble

PROJECT ENGINEER: [signature] 10/01/2013

PROJECT MANAGER: [signature] 10/01/13

INTERDEPARTMENTAL COORDINATION: N/A

WH 1050, Rev. March 98

Page 1 of 1

wyle Laboratories

| NOTICE OF ANOMALY | | DATE: 10/18/2013 |
|---|---|---|
| NOTICE NO: 3 | P.O. NUMBER: ES&S-MSA-TA029 | CONTRACT NO: N/A |
| CUSTOMER: Election Systems and Software (ES&S) | | WYLE JOB NO: T71013.02 |
| NOTIFICATION MADE TO: Mike Dammann & Mike Dornack | | NOTIFICATION DATE: 10/15/2013 |
| NOTIFICATION MADE BY: Alan Sherman | | VIA: In person |
| CATEGORY: [X] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT | | DATE OF ANOMALY: 10/15/2013 |
| PART NAME: ES&S ExpressVote | | PART NO: ExpressVote |
| TEST: Environmental Control – Operating Environment – Temp/Power | | I.D. NO: EV01315O025 |
| SPECIFICATION: EAC 2005 VVSG Volume I | | PARA NO: Section 4.1.2.14 & 7.1 |

**REQUIREMENTS: 2005 VVSG Volume I Section 4.1.2.14**

Test item shall be capable of simulated temperature and power variations that could be encountered in normal operating environments for voting systems using an environmental chamber and an adjustable power supply equivalent to the procedure in Mil. STD-810D, Method 502.2 and Method 501.2.

**DESCRIPTION OF ANOMALY:**

During the 22nd hour of testing, Wyle observed that ExpressVote, serial number: EVO1315O022, began to operate at a slower rate.

During the 24th hour of testing, Wyle observed that ExpressVote, serial number: EVO1315O025 began to operate at a slower rate.

During the 34th hour of testing, Wyle observed that ExpressVote, serial number: EVO1315O025 ceased to be fully functional. The audio stopped working. At this time, the test was halted.

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**

The final disposition is pending root cause analysis to be provided by the client.

Safety Related: [ ] YES [X] NO Internal 10 CFR Part 21: [ ] YES [ ] NO [X] N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: [ ] CUSTOMER [X] WYLE

CAR Generated: [ ] YES [X] NO CAR No.:

VERIFICATION:

TEST WITNESS: N/A

REPRESENTING: N/A

QUALITY ASSURANCE: Grady Vaus w/wyle

PROJECT ENGINEER: 10/18/13

PROJECT MANAGER: 10/18/2013

CROSS-DEPARTMENTAL COORDINATION: N/A

N/A

WP 1006, Rev. March 03

Page 1 of 1

wyle Laboratories

ORIGINAL

**NOTICE OF ANOMALY**

DATE: 10/18/2013

NOTICE NO: 4 P.O. NUMBER: ES&S-MSA-TA029 CONTRACT NO: N/A
CUSTOMER: Election Systems and Software (ES&S) WYLE JOB NO: T71013.02
NOTIFICATION MADE TO: Mike Darmanian & Mike Dvorsek NOTIFICATION DATE: 10/14/2013
NOTIFICATION MADE BY: Alan Simmons VIA: In person

CATEGORY: [X] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: 10/14/2013
PART NAME: ES&S ExpressVote PART NO: ExpressVote
TEST: Environmental Control – Operating Environment – Temp/Power I.D. NO. EVO113350025
SPECIFICATION: EAC 2005 VVSG, Volume I PARA. NO. Section 4.1.2.14 & 4.2.1

**REQUIREMENTS: 2005 VVSG Volume I Section 4.1.2.14**

Test item shall be capable of simulated temperature and power variation that would be encountered in normal operating environments for voting systems using an environmental chambers and an adjustable power supply equivalent to the procedure in MIL-STD-810D, Method 502.2 and Method 501.2.

**DESCRIPTION OF ANOMALY:**

During testing Wyle engineers observed that ExpressVote, serial numbers, EVO113350022 and EVO113350025, printed a ballot with printed data missing in a vertical line across the lenth of the ballot. The ballot would not scan into the scanner to become validated. All races and candidates were present on the ballot and correct, but pass fail criteria was that the ballot be scanned successfully.

**DISPOSITION • COMMENTS • RECOMMENDATIONS:**

The final disposition is pending a root cause analysis to be presented by the client.

Safety Relate: [ ] YES [X] NO Potential 10 CFR Part 21: [ ] YES [ ] NO [X] N/A
RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: [ ] CUSTOMER [ ] WYLE
CAR Required: [ ] YES [X] NO CAR NO:

VERIFICATION:
TEST WITNESS: None
REPRESENTING: None
QUALITY ASSURANCE:

PROJECT ENGINEER: 10/18/13
PROJECT MANAGER: 10-18-2013
INTERDEPARTMENTAL COORDINATION:

WH 1095, Rev. March '05 Page 1 of 1

ATTACHMENT B

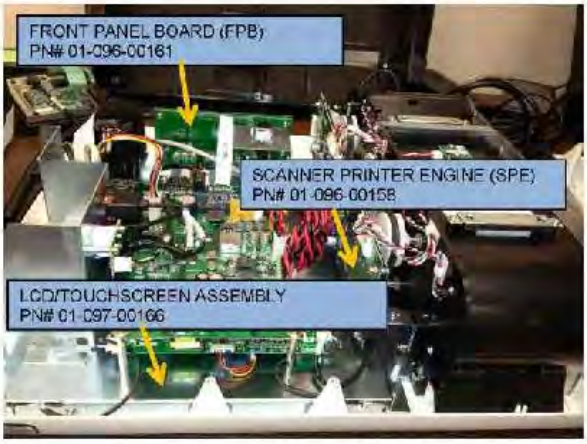
PHOTOGRAPHS


Photograph No. 1: ES&S FL EVS 4.5.0.0 PCA

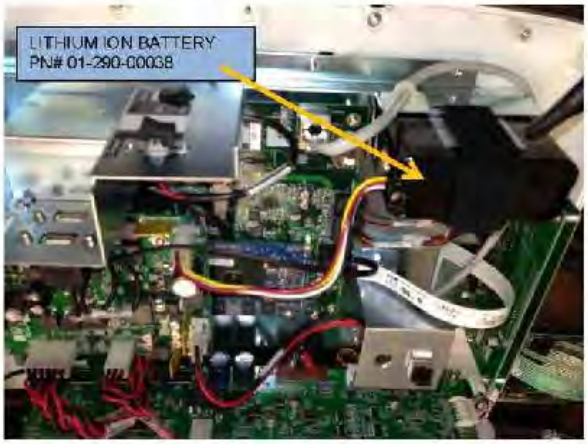
Photograph No. 2: ES&S FL EVS 4.5.0.0 PCA


Photograph No. 3: ES&S FL EVS 4.5.0.0 PCA


Photograph No. 4: ES&S FL EVS 4.5.0.0 PCA

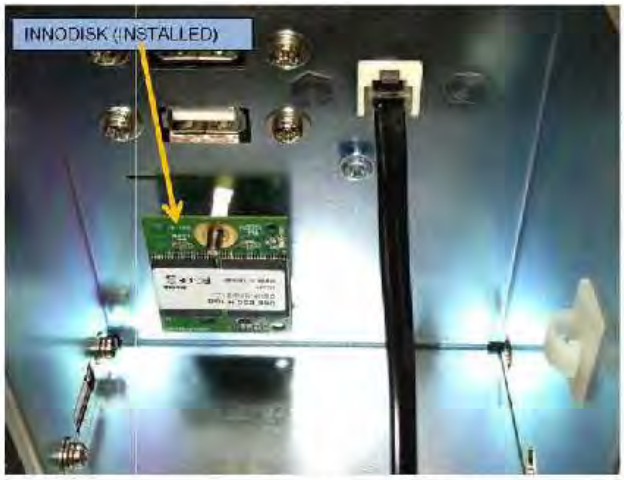



Photograph No. 5: ES&S FL EVS 4.5.0.0 PCA

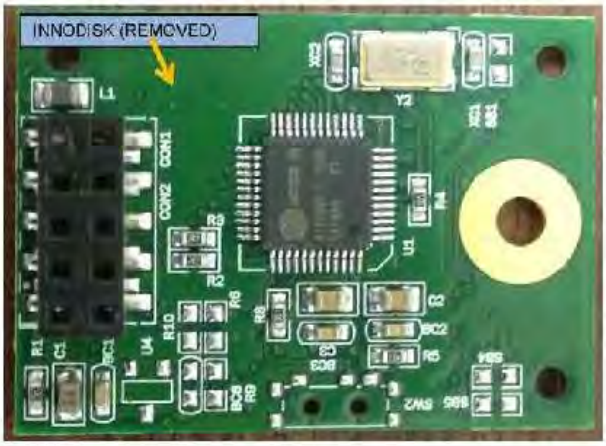



Photograph No. 6: ES&S FL EVS 4.5.0.0 PCA


Photograph No. 7: ES&S FL EVS 4.5.0.0 PCA




Photograph No. 8: ES&S FL EVS 4.5.0.0 PCA



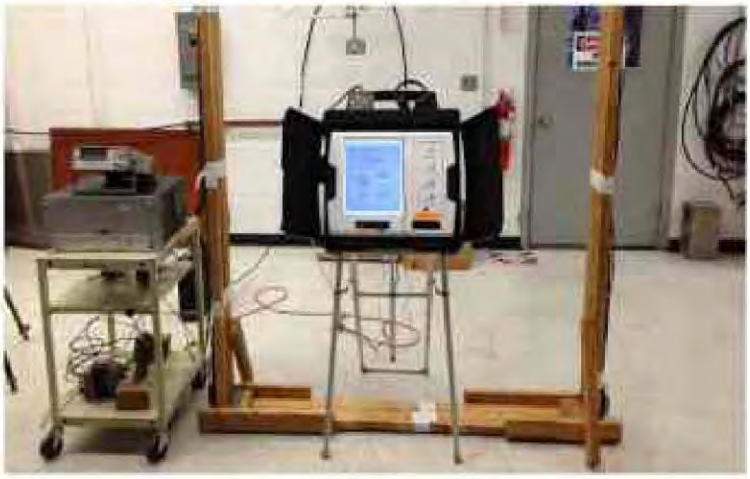

Photograph No. 9: ES&S FL EVS 4.5.0.0 PCA


Photograph No. 10: ES&S FL EVS 4.5.0.0 PCA


Photograph No. 11: EMS 4.5.0.11 Lightning Surge

Photograph No. 12: EMS 4.5.0.11 Lightning Surge

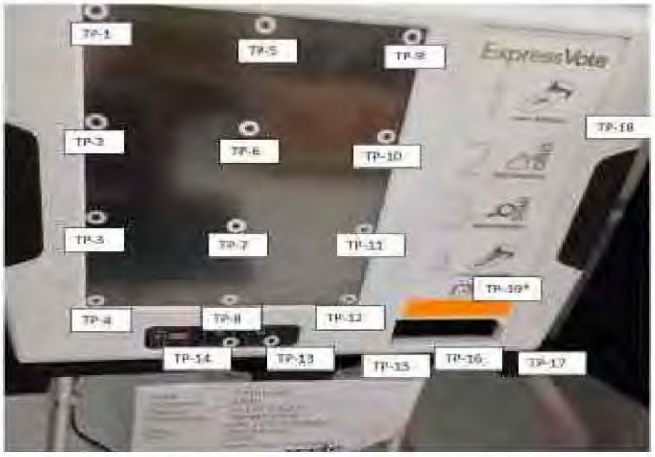
Photograph No. 13: ESS FL EVS 4.5.0.0 Magnetic Fields Immunity



Photograph No. 14: ESS FL EVS 4.5.0.0 Magnetic Fields Immunity

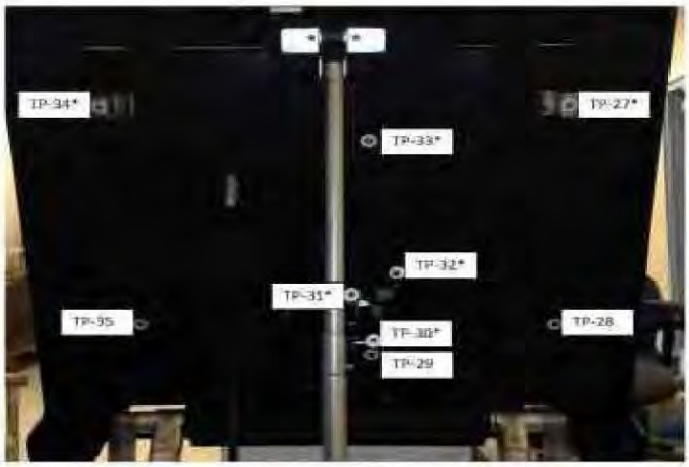
Photograph No. 15: ES&S FL EVS 4500 Electromagnetic Emissions

Photograph No. 16: ES&S FL EVS 4500 Electromagnetic Emissions




Photograph No. 17: ES&S FL EVS 4.5.0.0 Electrostatic Disruption

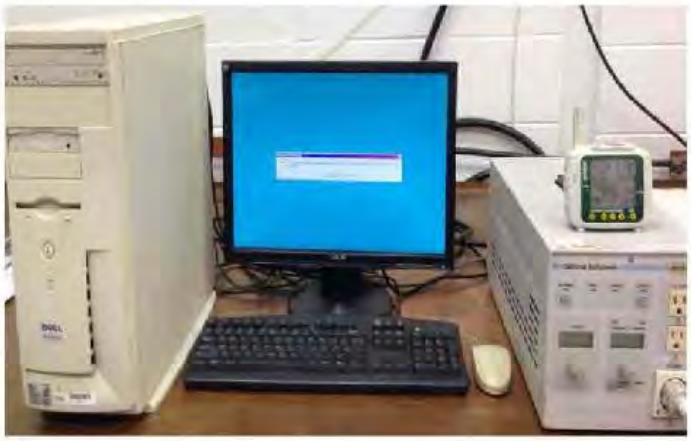

Photograph No. 18: ES&S FL EVS 4.5.0.0 Electrostatic Disruption




Photograph No. 19: ES&S FL EVS 4.5.0.0 Electrostatic Disruption


Photograph No. 20: ES&S FL EVS 4.5.0.0 Electrostatic Disruption

Photograph No. 21: ES&S FL EVS 4.5.0.0 Electrical Power Disturbance



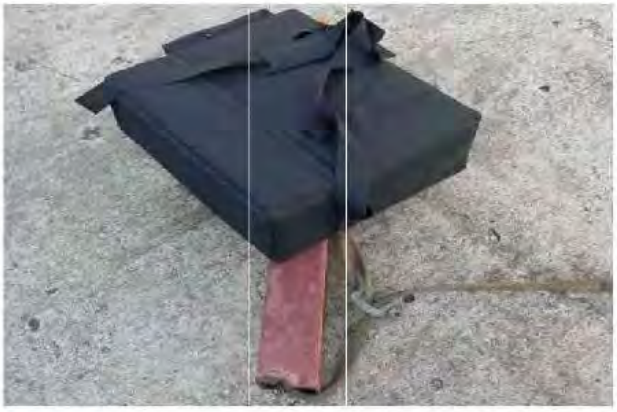
Photograph No. 22: ES&S FL EVS 4.5.0.0 Electrical Power Disturbance

Photograph No. 23: ES&S FL EVS 4.5.0.0 Electromagnetic Susceptibility

Photograph No. 24: ES&S FL EVS 4.5.0.0 Electromagnetic Susceptibility

Photograph No. 25: ES&S FL EVS 4.5.0.0 Temperature and Power Variation

Photograph No. 26: ES&S FL EVS 4.5.0.0 Temperature and Power Variation



Photograph No. 27: ES&S FL EVS 4.5.0.0 Bench Handling

Photograph No. 28: ES&S FL EVS 4.5.0.0 Bench Handling


Photograph No. 29: ES&S FL EVS 4.5.0.0 Humidity

Photograph No. 30: ES&S FL EVS 4.5.0.0 Humidity

Photograph No. 31: FSAS FL EVS 4.5.1.6 Low Temperature

Photograph No. 32: FSAS FL EVS 4.5.1.6 Low Temperature

Photograph No. 35: ES.8S FL EVS 4.5.0.0 Sand and Dust

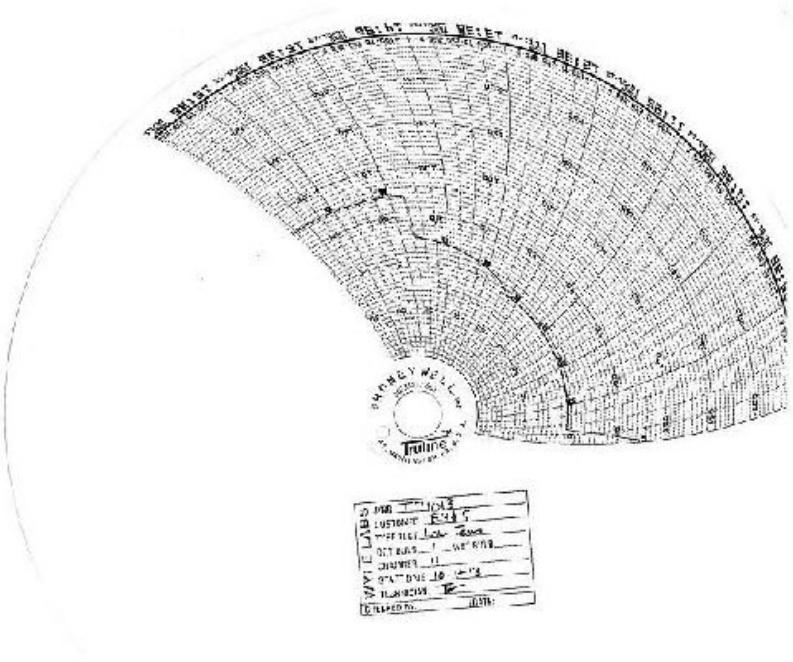
Photograph No. 36: ES.8S FL EVS 4.5.0.0 Sand and Dust

Photograph No. 37: ES&S FLEVS 4.5.0.0 Rain

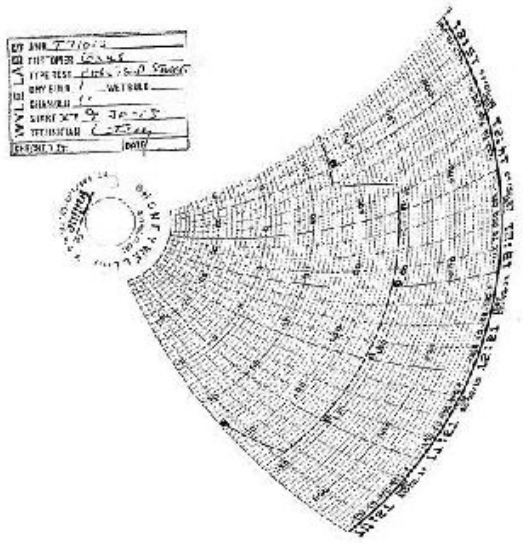
ATTACHMENT C

NON-OPERATING ENVIRONMENTAL TEST DATA

LOW TEMPERATURE TEST DATA



HIGH TEMPERATURE TEST DATA



VIBRATION TEST DATA

# VIBRATION TEST DATA SHEET

Customer: E3&S VOTING SYSTEMS Spec: Subcontract: E&S EXPRESS VOTE

Job No: T71013 Method: 514.3 CATEGORY 1 Part No: Substitution Tested: Ambient

GSE: Yes ☐ No [X] Procedure: MIL-STD-810D S/N: Prior: Yes [X] No ☐

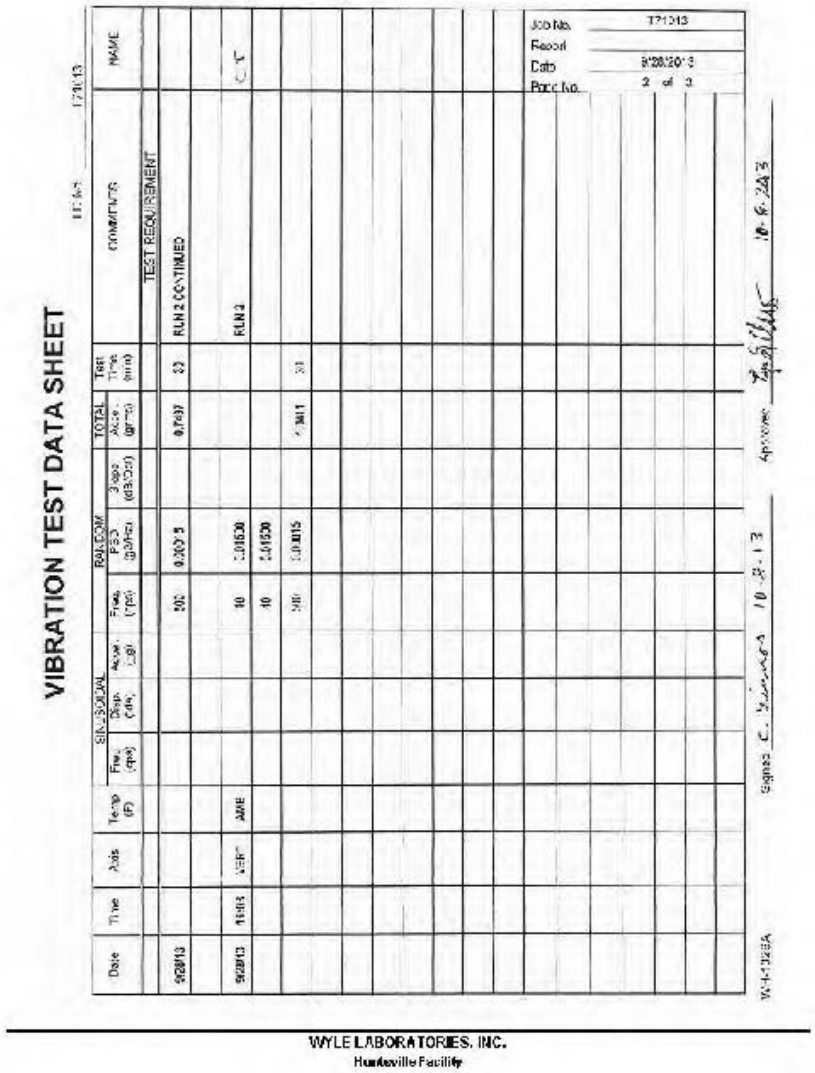
Test Title: BASIC TRANSPORTATION COMMON CARRIER RANDOM VIBRATION

| Date | Time | Axis | Temp (°F) | Temp (°C) | SINUSOIDAL Disp. (.dD) | Accel. (rms) | RANDOM Freq. (GCH) | PSD (g²/Hz) | Slope (dB/OCT) | TOTAL Grms | Test Time (Hr) | COMMENTS | NAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | TEST REQUIREMENT | |
| 9/28/13 | 8:25 | TRANS | AMB | | | | 10 | 0.00013 | | | | RUN 1 | C.T. |
| | | | | | | | 20 | 0.00065 | | | | | |
| | | | | | | | 30 | 0.00065 | | | | | |
| | | | | | | | 70 | 0.00002 | | | | | |
| | | | | | | | 79 | 0.00019 | | | | | |
| | | | | | | | 130 | 0.00019 | | | | | |
| | | | | | | | 500 | 0.0001 | | 0.635 | 31 | | |
| | | | | | | | | | | | | RUN 2 | C.T. |
| 9/28/13 | 9:32 | LONG | AMB | | | | 10 | 0.00050 | | | | | |
| | | | | | | | 20 | 0.00050 | | | | | |
| | | | | | | | 100 | 0.00020 | | | | | |
| | | | | | | | 121 | 0.00320 | | | | | |
| | | | | | | | 200 | 0.00320 | | | | | |
| | | | | | | | 240 | 0.00140 | | | | | |
| | | | | | | | 500 | 0.00020 | | | | | |

Job No: T71013
Report No.
Date: 9/28/2013
Page No: 1 of 2

Signed: C. Tavares 10-3-13 Approved: [signature] 10-3-2013

WYLE LABORATORIES, INC.
Huntsville Facility



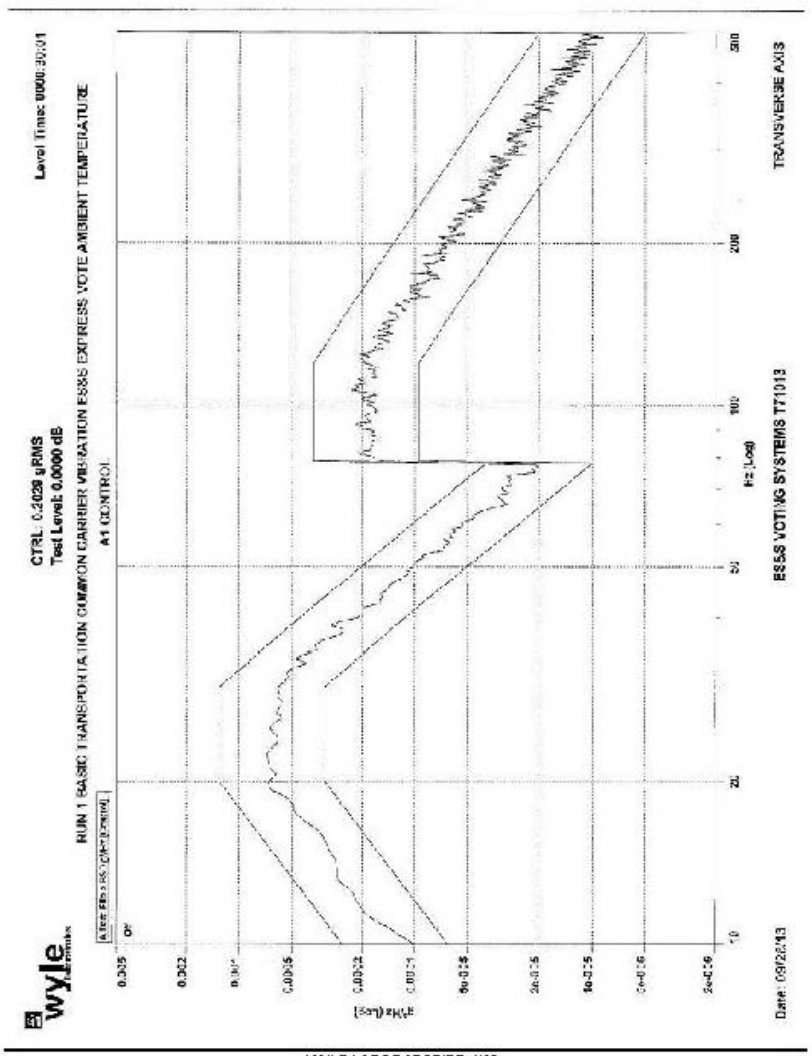
VIBRATION TEST DATA SHEET

| Date | Time | Axis | Temp (F) | Flow (cfm) | SINUSOIDAL Disp. (+/-) | SINUSOIDAL Accel. (+/-g) | RANDOM Freq. (Hz) | RANDOM PSD (g²/Hz) | Slope (dB/Oct) | TOTAL Accel. (grms) | Test Time (min) | COMMENTS | NAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | TEST REQUIREMENT | |
| 9/28/13 | | | | | | | 20 | 0.2075 | | 0.7697 | 23 | RUN 2 CONTINUED | |
| | | | | | | | | | | | | RUN 2 | C.T. |
| | | | | | | | 10 | 0.01620 | | | | | |
| | | | | | | | 40 | 0.01620 | | | | | |
| | | | | | | | 500 | 0.00115 | | 0.3811 | 30 | | |

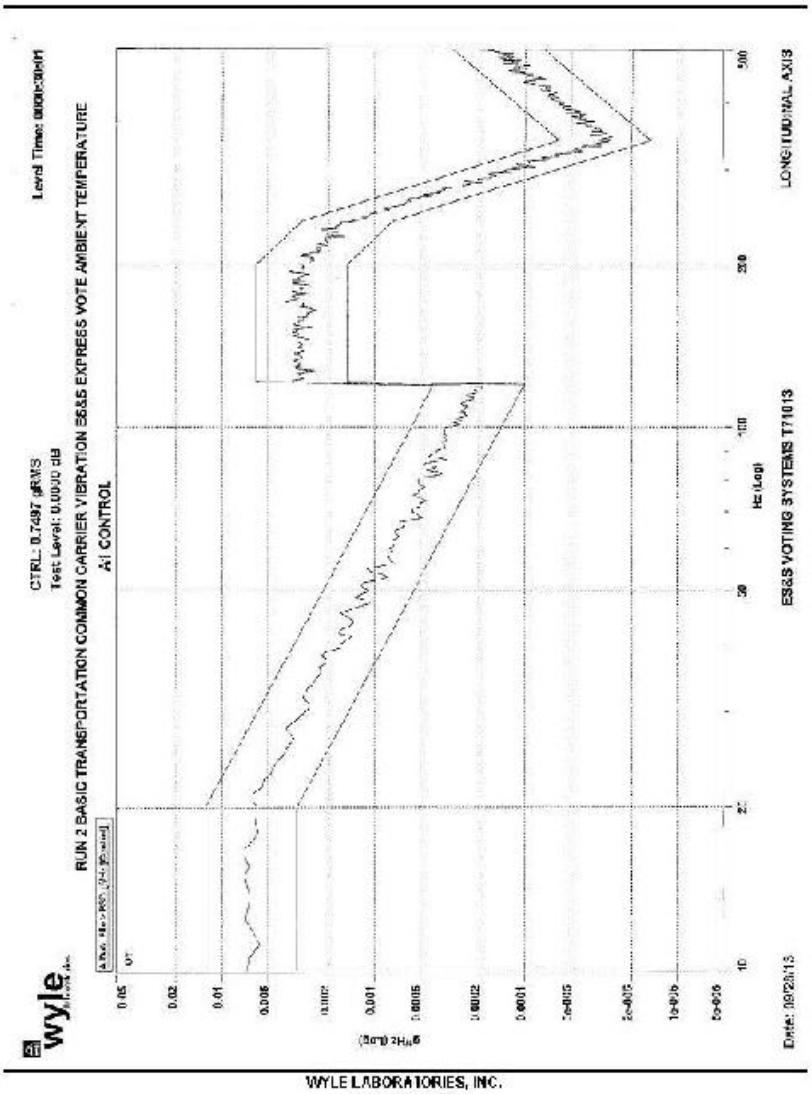
Job No. T71013
Record
Date 9/28/2013
Page No. 2 of 3

Signed C. Yamamoto 10-3-13 Approved 10-6-2013

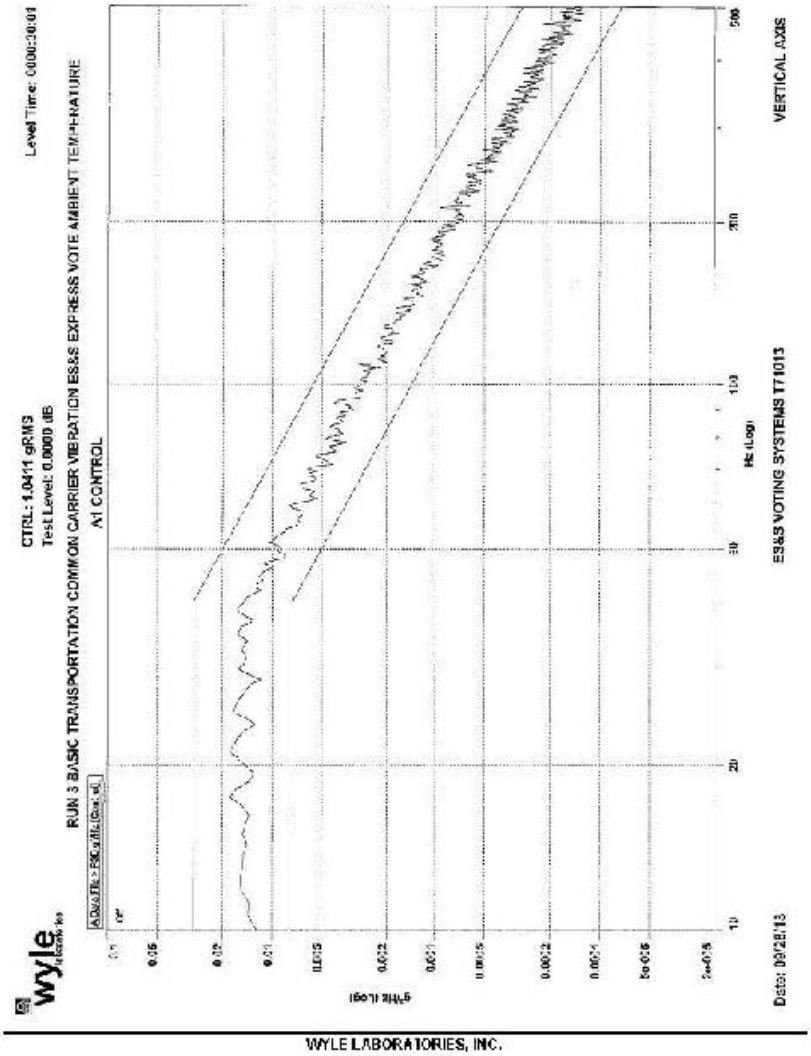
WYLE LABORATORIES, INC.
Huntsville Facility




WYLE LABORATORIES, INC.
Huntsville Facility




WYLE LABORATORIES, INC.
Huntsville Facility




WYLE LABORATORIES, INC.
Huntsville Facility

BENCH HANDLING TEST DATA

wyle Laboratories

# DATA SHEET

Customer ESES
Specimen EVS 4500
Part No. Express Wrap
Spec. ESE 21.05.005.1
Para. 4.6.7
S/N EVS113350021

Amb. Temp. ~75°F
Photo: Yes
Test Med. Air
Specimen Temp. Ambient

Job No. T71013.02
Report No. T71013.02-01
Start Date 10/3/13

Test Title Booth Handling

| | |
|---|---|
| Drop Height: 4' | |
| Edge 1: Drops 1-6 | ✓ OK |
| Edge 2: Drops 7-12 | ✓ OK |
| Edge 3: Drops 13-18 | ✓ OK |
| Edge 4: Drops 19-24 | ✓ OK |
| Post-Test Inspection: | Post drop stability check completed<br>per unit under test within spec limits<br>Test Article complete 10/3/13<br>9:15 am |

Tested By _____ Date 10-3-13
Technician

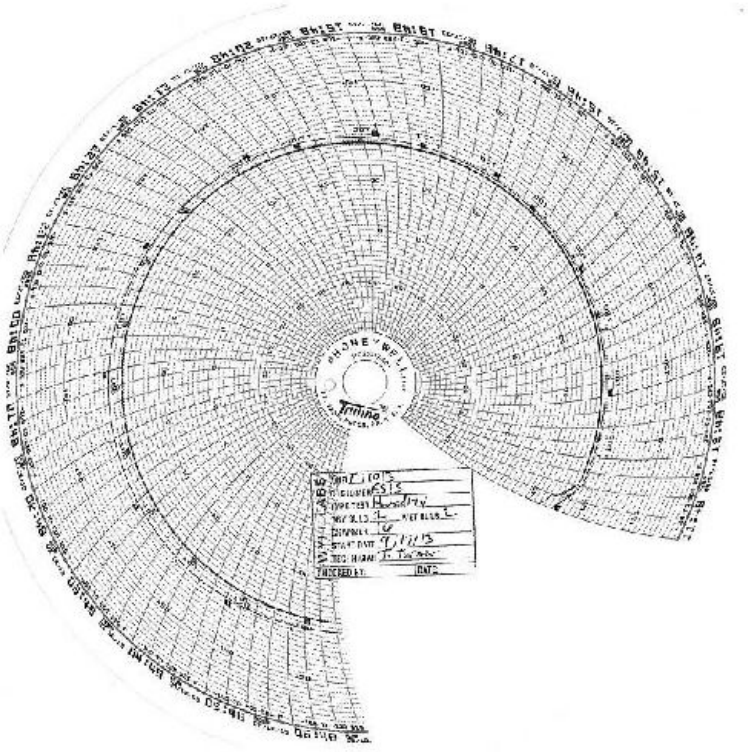
Sheet No. 1 of 1

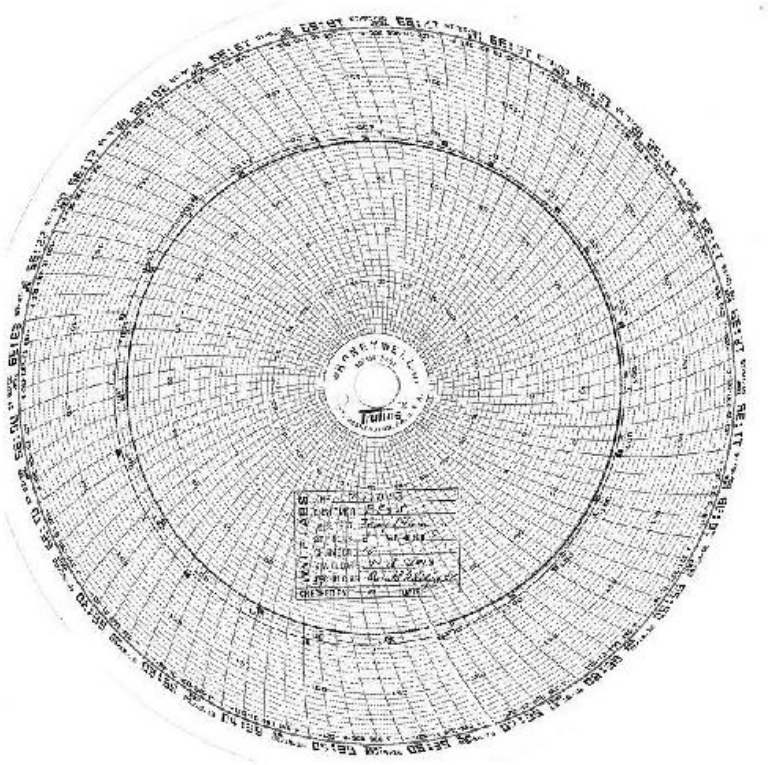
Notice of Anomaly N/A

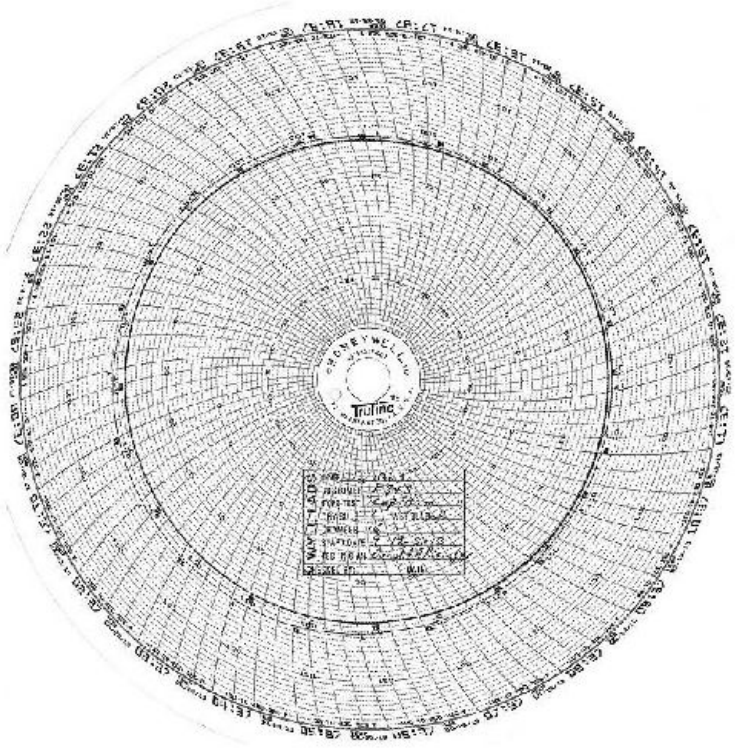
Approved _____ 10-3-13
Project Engineer

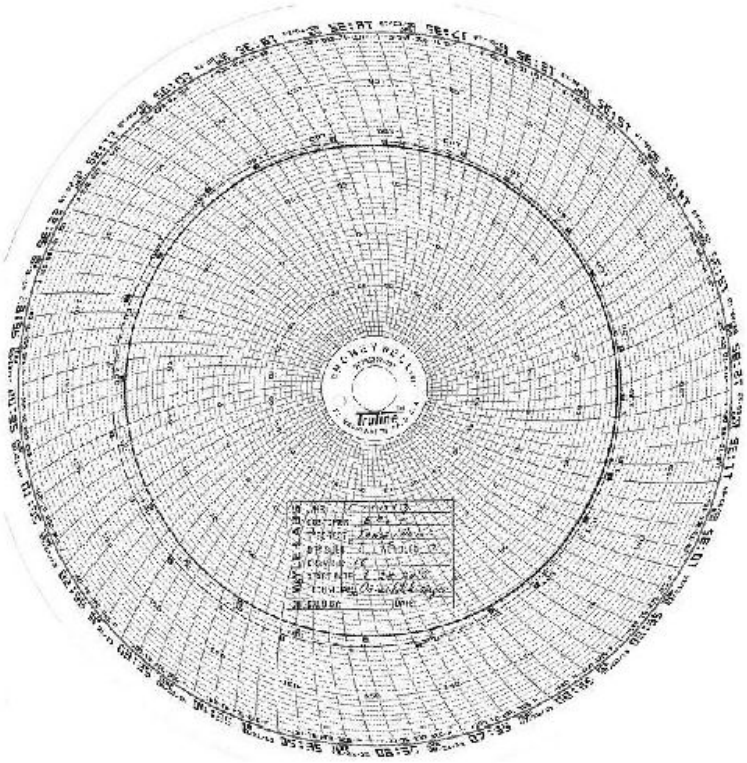
WYE Form WI-5114A, Rev. Jun 05

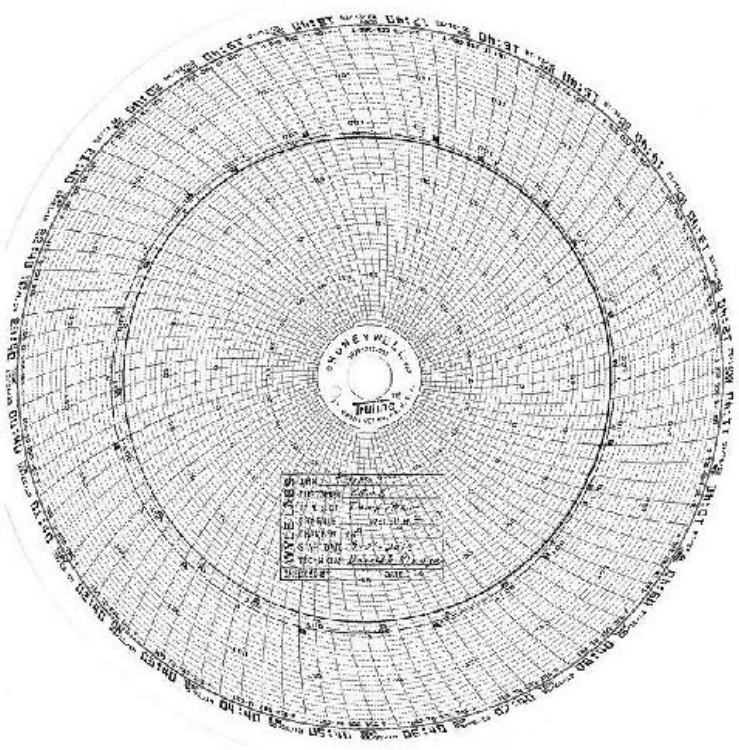
HUMIDITY TEST DATA

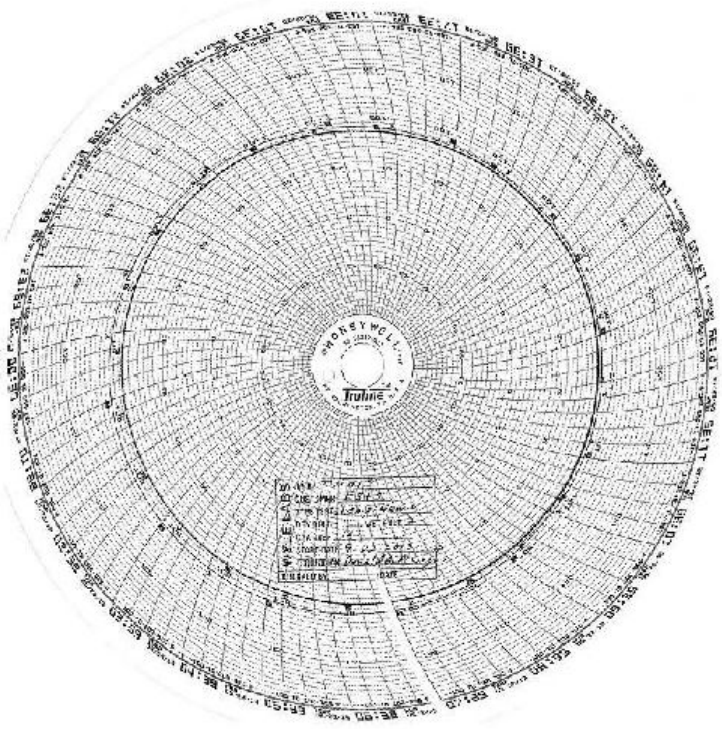


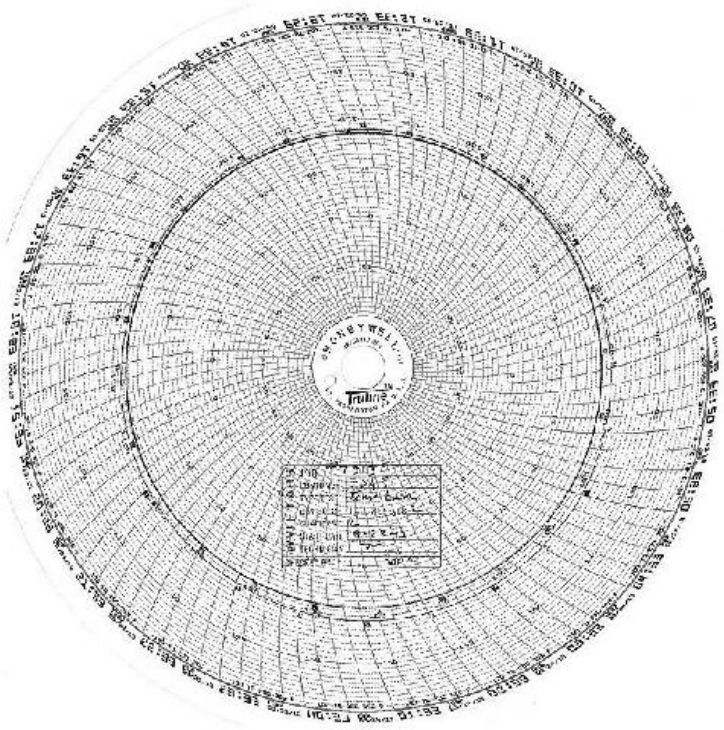


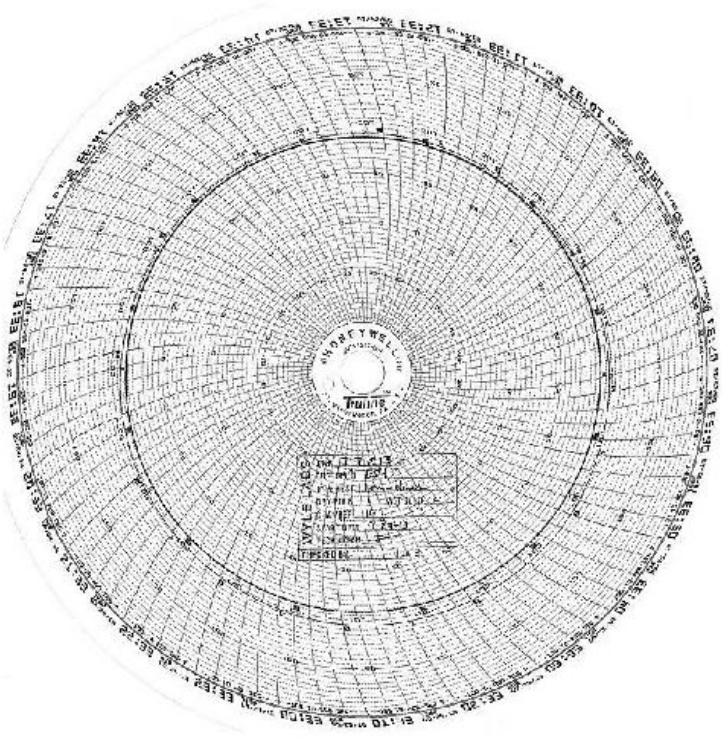

HONEYWELL
Truline

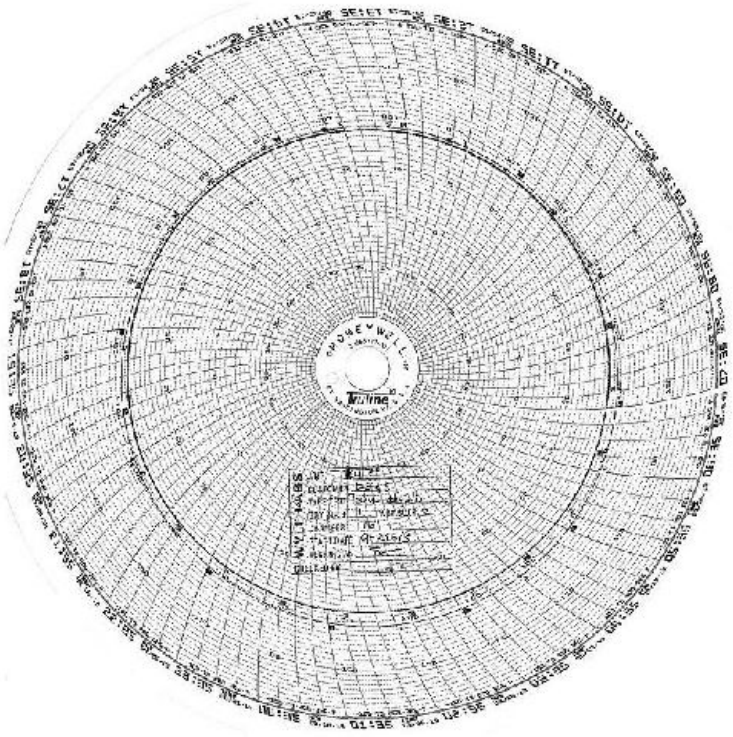


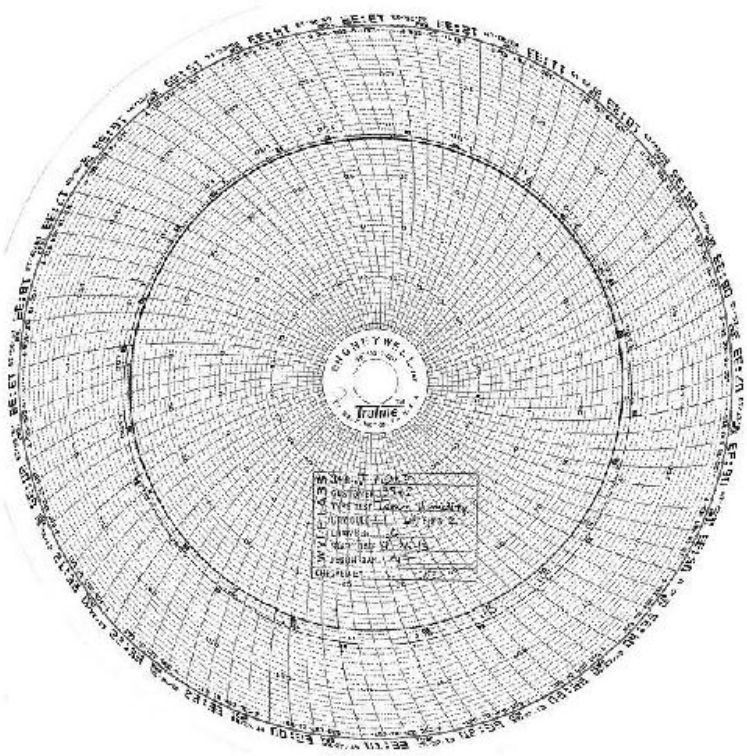



HONEYWELL
Truline

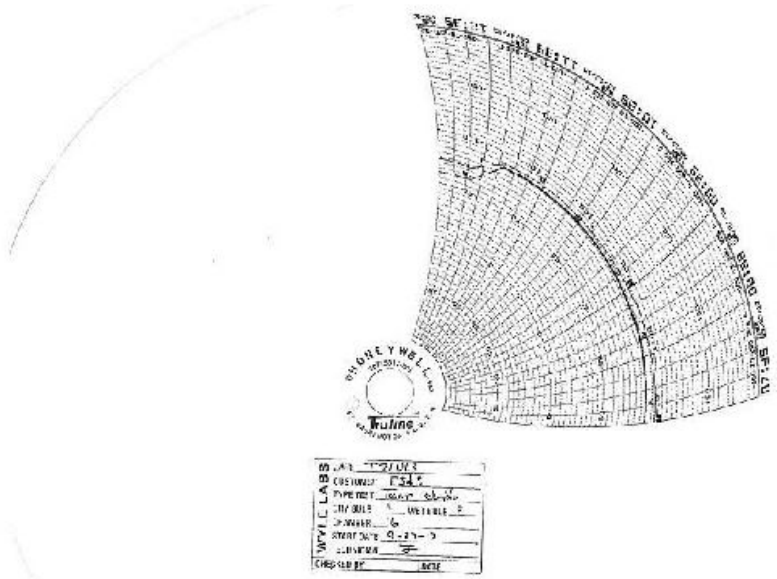








WYLE LABORATORIES, INC.
Huntsville Facility



DUST TEST DATA

ATTACHMENT D

ELECTRICAL TEST DATA

ELECTROSTATIC DISRUPTION

wyle Laboratories

# DATA SHEET

Job No.: T71013.02
Start Date: 30 Sep 2013

Customer: ES&S (page 1 of 3)
EUT: FL EVS 4500
Model No.: ExpressVote
Serial No.: EV01133500029
Test Title: Electrostatic Discharge

Temperature: 19.5°C
Humidity: 46.2%
Measurement Point: See Test Points Below
Interference Signal: See Applied Signal
Frequency Range: N/A

| Test Points | Meets Limit Yes | Meets Limit No | Applied Level (kV) | Discharge Type | Times Tested | Comments |
|---|---|---|---|---|---|---|
| TP000: Vertical Coupling Plane | | | +2, 4, 8 | Contact | 10 | Each Side of EUT |
| TP001: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP002: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP004: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP005: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP006: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP007: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP008: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP009: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP010: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP011: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP012: Touch Screen | | | +2, 4, 8 | Contact | 10 | |
| TP013: Headphone Jack | | | +2, 4, 8 | Contact | 10 | |
| TP014: Dial Switch Access Port (ESA) | | | +2, 4, 8, 15 | Air | 10 | |
| TP015: Bottom Left Paper Path Door | | | +2, 4, 8, 15 | Air | 10 | |
| TP016: Bottom Middle Paper Path Door | | | +2, 4, 8, 15 | Air | 10 | |
| TP017: Bottom Right Paper Path Door | | | +2, 4, 8, 15 | Air | 10 | |
| TP018: Top Right Paper Path Door | | | +2, 4, 8, 15 | Air | 10 | |
| TP019: Paper Roll Door Latch | | | +2, 4, 8, 15 | Air | 10 | |
| TP020: Left and/or Handle Top Screw | | | +2, 4, 8, 15 | Air | 10 | |
| TP021: Left and/or Handle Middle Screw | | | +2, 4, 8, 15 | Air | 10 | |

Notice of Anomaly: NOA 1 & 2
Witness: N/A
WH 1318, Rev. Dec. 2001

Tested By: [signature] Date: 09/30/13
Approved: [signature] Date: 09/30/2013
Project Engineer

wyle Laboratories

# DATA SHEET

Job No.: T71013.02
Start Date: 30 Sep 2013

Customer: ESK'S (Page 2 of 2)
EUT: EL EVS 4503
Model No.: ExpressVote
Serial No.: EV01133L029
Test Title: Electrostatic Discharge

Temperature: 19.5 C
Measurement Point: See Test Points Below
Interference Signal: See Applied Signal
Frequency Range: N/A
Humidity: 46.2%

| Test Points | Meets Limit: Yes | Meets Limit: No | Applied Level (kV) | Discharge Type | Times Tested | Comments |
|---|---|---|---|---|---|---|
| TP022: Middle Right Type Pad Door | | | ±2, 4, 8, 15 | Air | 10 | |
| TP023: Left Inside Handle Bottom Screw | | | ±2, 4, 8, 15 | Air | 10 | |
| TP024: Top Left Side of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP025: Top Left Side of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP026: Middle Left Side of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP027: Top Right Screw on Back of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP028: Bottom Right on Back of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP029: Bottom Middle on Back of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP030: Power Supply Connector Cable of EUT Exhausted for Table Top Use | | | ±2, 4, 8, 15 | Air | 10 | |
| TP031: Metal Manifold, located NE to DC connector plug | | | ±2, 4, 8, 15 | Air | 10 | |
| TP032: Center Middle Screw on Back of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP033: Top Middle Screw on Back of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP034: Top Left Screw on Back of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP035: Bottom Left on Back of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP036: Top Right Screw of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP037: Left on Right Side of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP038: Bottom Right Side of EUT | | | ±2, 4, 8, 15 | Air | 10 | |
| TP039: Right Inside Handle Top Screw | | | ±2, 4, 8, 15 | Air | 10 | |
| TP040: Right Inside Handle Middle Screw | | | ±2, 4, 8, 15 | Air | 10 | |
| TP041: Right Inside Handle Bottom Screw | | | ±2, 4, 8, 15 | Air | 10 | |

Notice of Anomaly: 2016, Ltr 2
Witness: N/A

Tested By: Date: 09/30/13
Approved: Ryan A. Chaffin, Project Engineer Date: 09/30/2013

WYLE LABORATORIES, INC.
Huntsville Facility

ELECTRICAL POWER DISTURBANCE TEST DATA

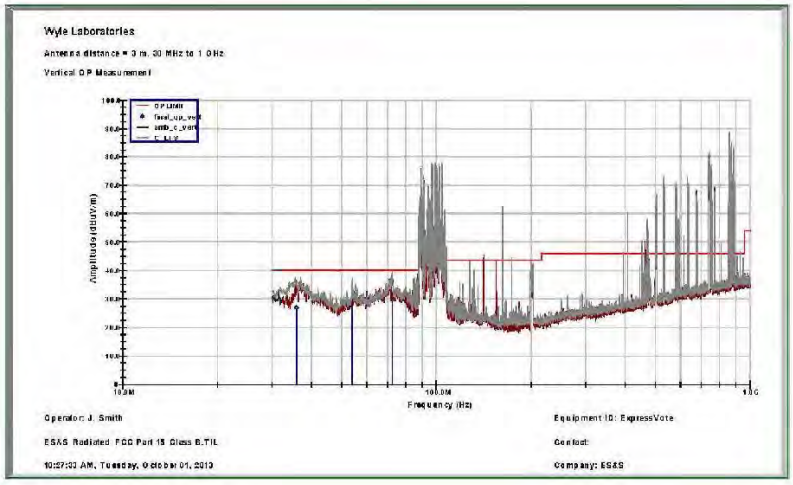
California Instruments Corp.
Data entry mode: Absolute

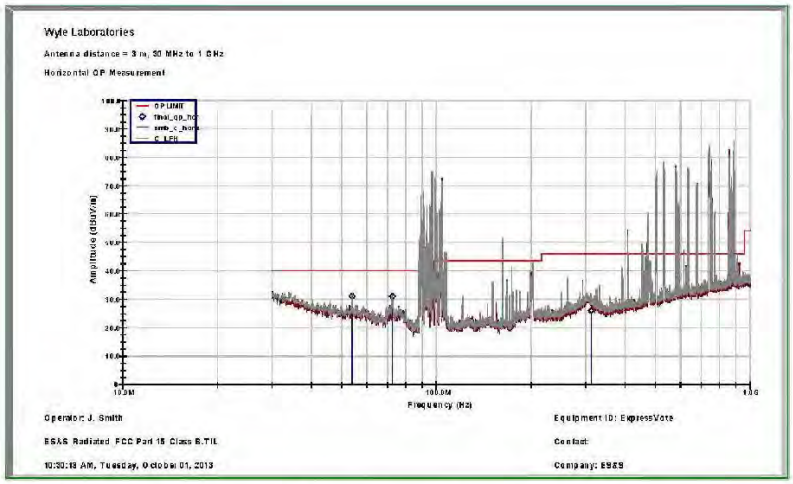
| No. | Type | Time(s) | Volt |
|---|---|---|---|
| 1 | V Step | 60.000 | 120.0 |
| 2 | V Step | 0.500 | 84.1 |
| 3 | V Step | 60.200 | 120.0 |
| 4 | V Step | 0.100 | 48.0 |
| 5 | V Step | 60.200 | 120.0 |
| 6 | V Step | 1.000 | 48.0 |
| 7 | V Step | 30.000 | 120.0 |
| 8 | V Step | 5.000 | 5.0 |
| 9 | V Step | 60.000 | 120.0 |
| 10 | V Step | 1.000 | 102.0 |
| 11 | V Step | 60.000 | 120.0 |
| 12 | V Step | 1.000 | 138.0 |
| 13 | V Step | 60.000 | 120.0 |
| 14 | V Step | 60.000 | 126.0 |
| 15 | V Step | 60.000 | 120.0 |
| 16 | V Step | 14400.000 | 105.0 |
| 17 | V Step | 60.000 | 120.0 |
| 18 | Empty | | |

Transient List: sk.EVP
Printed on: Thursday, September 19, 2013 4:10:35 PM

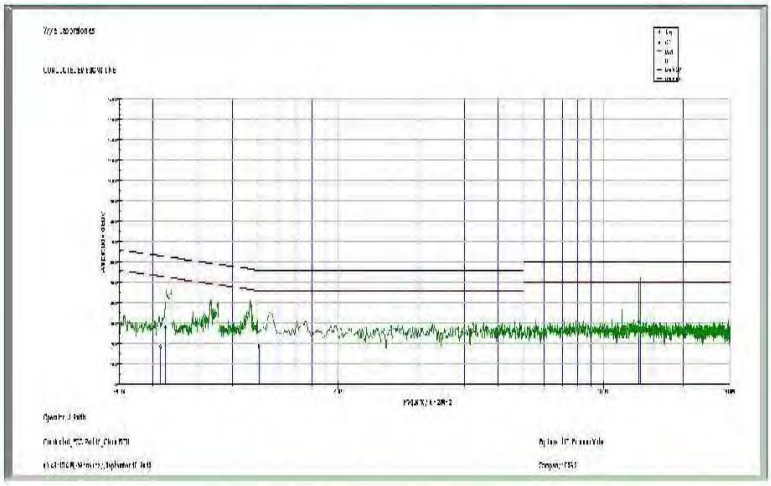
Page #1

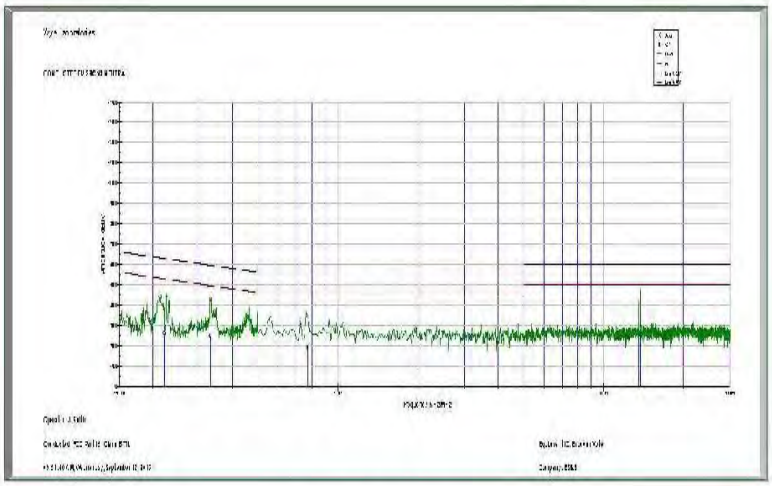
ELECTROMAGNETIC RADIATION TEST: RADIATED EMISSIONS TEST DATA


Wyle Laboratories
Antenna distance = 3 m, 30 MHz to 1 GHz
Vertical CP Measurement
CP Limit
Amplitude (dBuV/m)
Frequency (Hz)
Operator: J. Smith
Equipment ID: ExpressVote
ESAS Radiated FCC Part 15 Class B.TIL
Contact:
10:27:03 AM, Tuesday, October 01, 2013
Company: ESAS


Wyle Laboratories
Antenna distance = 3 m, 30 MHz to 1 GHz
Horizontal CP Measurement
CP LIMIT
Amplitude (dBuV/m)
Frequency (Hz)
Operator: J. Smith
Equipment ID: ExpressVote
ESAS Radiated FCC Part 15 Class B.TIL
Contact:
10:30:18 AM, Tuesday, October 01, 2013
Company: ESAS

ELECTROMAGNETIC RADIATION TEST: CONDUCTED EMISSIONS TEST DATA





ELECTROMAGNETIC SUSCEPTIBILITY TEST DATA

wyle laboratories

# DATA SHEET

Job Nos: T71013.02
Start Date: 28 Oct 13

Customer: ES&S
EUT: EXPRESSVOTE
Model No.: EXPRESSVOTE
Serial No.: EV01132500129

Temperature: 21.0°C
Humidity: 43.9%
Measurement Point: EUT @ All Four Sides
Interference Signal: 1Khz @ 80% AM
Frequency Range: 80Mhz to 1Ghz

Test Title: IEC 61000-4-3 (Electromagnetic Susceptibility)

| Test Frequency | Meets Limit | | Susceptibility Threshold Level | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| ( )kHz (X)MHz ( )GHz | Yes | No | ( )A ( )V ( )nV (X)V/m ( )nV/m ( )dBpA ( )dBpV ( )dBpV/m ( )pBpT | | |
| 80 | X | | >10 | 10 | Vertical and Horizontal |
| ↓ | ↓ | | ↓ | ↓ | ↓ |
| 1.00 | X | | >10 | 10 | Vertical and Horizontal |

Notes of Anomaly: N/A
Witness: N/A

Tested By: [signature] Technician Date: 10-28-2013
Approved: [signature] Project Engineer Date: 10/28/13

Page 1 of 1

WI-1132, Rev Dec. 2001

WYLE LABORATORIES, INC.
Huntsville Facility

ELECTRICAL FAST TRANSIENT TEST DATA

wyle Laboratories

# DATA SHEET

Job No.: T71013.02
Start Date: 03 Oct 13

Customer: ES&S | Temperature: 21.0 C | Humidity: 47.7%
EUT: ExpressVote | Measurement Point: See Comments Below
Model No.: ExpressVote | Interference Signal: Test Signal Applied @ SSDuS
Serial No.: EV01L3350029 | Frequency Range: See Test Frequencies Below

Test Title: EN 61000-4-4 (Electrical Fast Transient)

| Test Frequency | Meets Limit | | Susceptibility Threshold Level | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| (X)kHz ( )MHz ( )GHz | Yes | No | ( )A ( )V (X)kV ( )V/m ( )Vrms ( )dBµA ( )dBµV ( )dBuV/m ( )dBpT | | |
| .060 | X | | >1 | 1 | Line to Neutral |
| .060 | ↓ | | ↓ | ↓ | Line to Ground |
| .060 | X | | >1 | 1 | Neutral to Ground |

Notice of Anomaly: N/A
Witness: N/A

Tested By: [signature] Date: 10/03/13
Approved: [signature] Date: 10/03/2013
Project Engineer

Page 1 of 1

EUT PIC: See Doc 500

LIGHTNING SURGE TEST DATA

wyle Laboratories

# DATA SHEET

Job No.: T71013.02
Start Date: 02 Oct 13

Customer: DS&S
EUT: ExpressVote
Model No.: ExpressVote
Serial No.: BVE113050029

Temperature: 22.7° C
Humidity: 41.9%
Measurement Point: See Comments Below
Interference Signals: Test Signal Applied @ 1.25/1nS
Frequency Range: See Test Frequencies Below

Test Title: EN 61000-4-5 (Lightning Surge - ext)

| Test Frequency | Meets Limit | | Susceptibility Threshold Level | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| (X)kHz ( )MHz ( )GHz | Yes | No | ( )A ( )V (X)kV ( )Vrms ( )CBmA ( )uBmV ( )dBpVrm ( )dBpT | | |
| .06G | X | | >2 | 2 | Line to Neutral @ 0°, 90°, 180°, and 270° |
| 06G | ↓ | | ↓ | ↓ | Line to Ground @ 0°, 90°, 180°, and 270° |
| 06G | X | | >2 | 2 | Neutral to Ground @ 0°, 90°, 180°, and 270° |
| | | | | | |
| 06G | X | | >1 | 1 | Line to Neutral @ 0°, 90°, 180°, and 270° |
| 06G | ↓ | | ↓ | ↓ | Line to Ground @ 0°, 90°, 180°, and 270° |
| 06G | X | | >1 | 1 | Neutral to Ground @ 0°, 90°, 180°, and 270° |
| | | | | | |
| 06G | X | | >2 | 2 | Line to Neutral @ 0°, 90°, 180°, and 270° |
| 06G | ↓ | | ↓ | ↓ | Line to Ground @ 0°, 90°, 180°, and 270° |
| 06G | X | | >2 | 2 | Neutral to Ground @ 0°, 90°, 180°, and 270° |

Notice of Anomaly: N/A
Witness: N/A

Tested By: Technician Date: 10/03/13
Approved: Project Engineer Date: 10/03/2013

Page 1 of 1

W-1483 Rev. Dec 2001

CONDUCTED RF IMMUNITY TEST DATA

wyle laboratories

# DATA SHEET

Job No.: T71013.02
Start Date: 21 Sep 13

| | | | | | |
|---|---|---|---|---|---|
| Customer: | ESDS | Temperature: | 23.5°C | Humidity: | 42.9% |
| EUT: | Express Vote | Measurement Point: | | See Comments Below | |
| Model No: | Express Vote | Interference Signals: | | 1 kHz @ 80% AM | |
| Serial No.: | EVH13450129 | Frequency Range: | | 150 kHz to 80 MHz | |

Test Title: EN 61000-4-6 (Conducted RF Immunity)

| Test Frequency | Meets Limit | | Susceptibility Threshold Level | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| ( )kHz ( )MHz ( )GHz | Yes | No | ( )A ( )V ( )W ( )V/m ( )Vrms ( )dBµA ( )dBµV ( )dBµV/m ( )dBpT | | |
| 150 | X | | >10 | 10 | AC Input |
| ↓ | ↓ | | ↓ | ↓ | ↓ |
| 80 | X | | >10 | 10 | AC Input |

Point of Anomaly: N/A
Witness: N/A

Tested By: [signature] Date: 09/20/2013
Approved: [signature] Date: 09/20/2013
Project Engineer

Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

MAGNETIC FIELDS IMMUNITY TEST DATA

wyle laboratories

# DATA SHEET

Job No.: T71013.12
Start Date: 18 Sept 13

Customer: ES&S
EUT: ExpressVote
Model No.: ExpressVote
Serial No.: EV0113350029

Temperature: 22.1° C
Humidity: 19.9%
Measurement Points: See Comments Below
Interference Signal: CW for a Period of 5 Minutes
Frequency Ranges: See Test Frequencies Below

Test Title: EN 61000-4-8 (Magnetic Field Immunity)

| Test Frequency | Meets Limit | | Susceptibility Threshold Level | Maximum Signal Applied | Comments |
|---|---|---|---|---|---|
| (S)kHz ( )MHz ( )GHz | Yes | No | ( )V ( )mV ( )μV/m ( )Vrms ( )dBμA ( )dBμV ( )dBμV/m ( )dBpT | | |
| 60 | X | | >30 A/m | 30 A/m | EUT on X, Y, and Z Axis |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Witness: [signature] Tested By: [signature] Date: 09/18/13

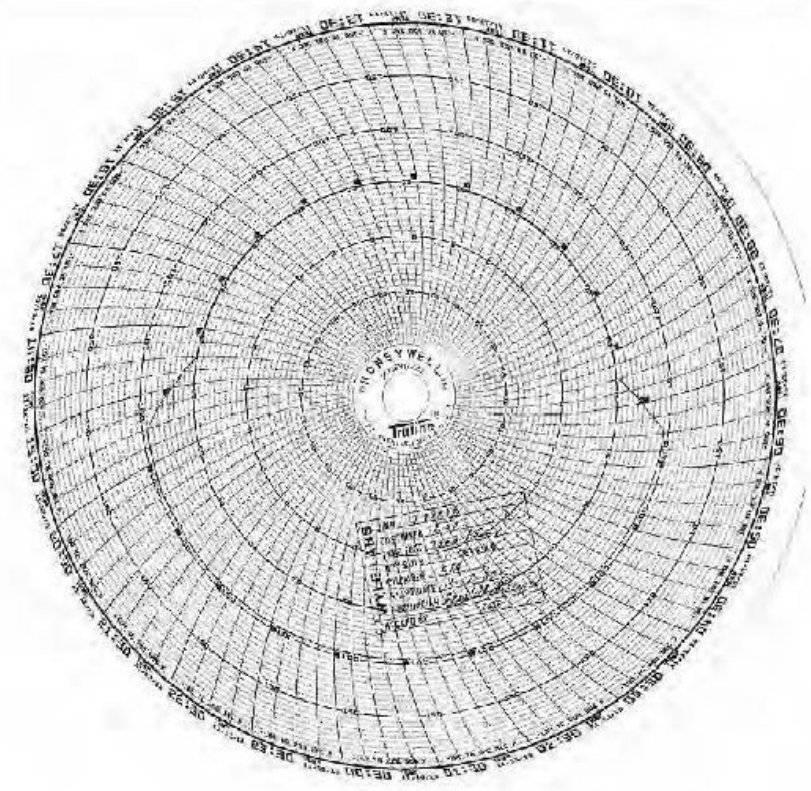
Approved: [signature] Technician / Project Engineer Date: 09/18/2013

Page 1 of 1

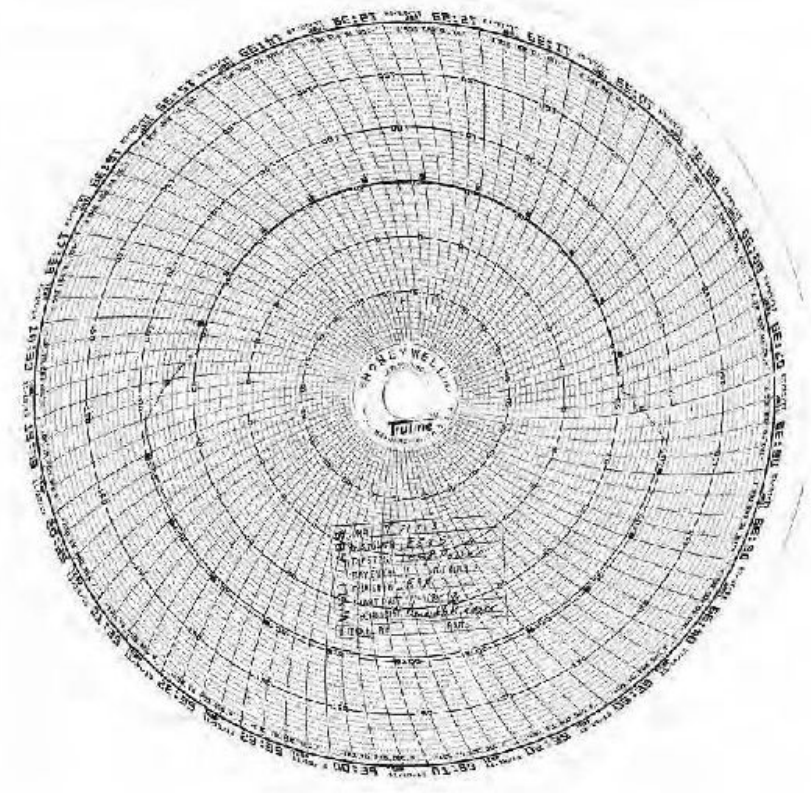
ATTACHMENT E

OPERATING ENVIRONMENTAL TEST DATA

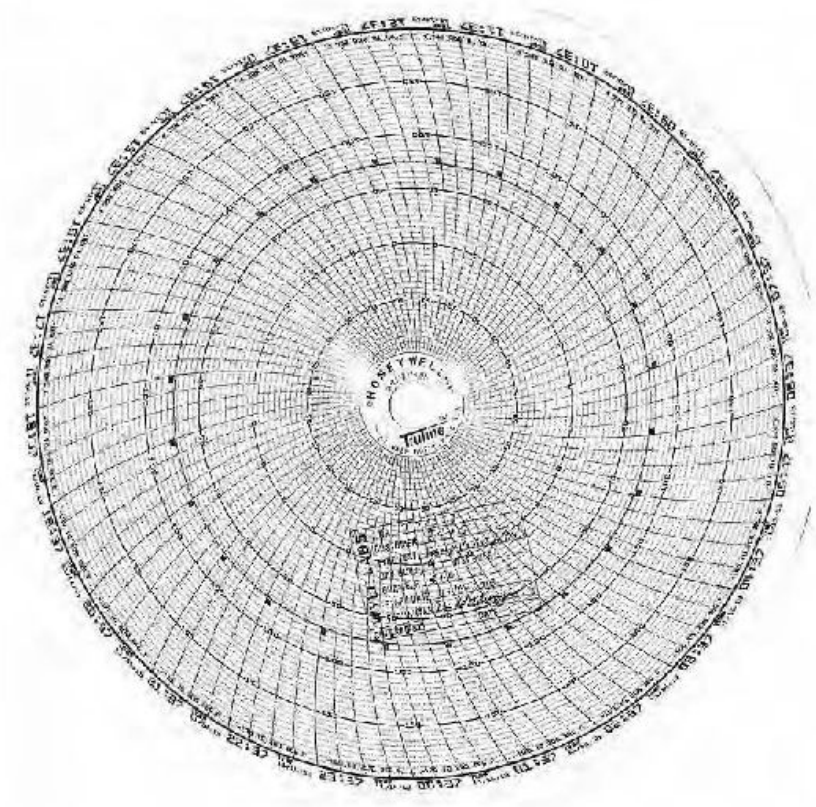
TEMPERATURE/POWER VARIATION TEST DATA



WYLE LABORATORIES, INC.
Huntsville Facility




WYLE LABORATORIES, INC.
Huntsville Facility



ATTACHMENT F

PRODUCT SAFETY CERTIFICATE OF CONFORMANCE

wyle laboratories
7800 Highway 20 West
Huntsville, Alabama 35806
Phone (256) 837-4411
Fax (256) 721-0144
www.wyle.com

## CERTIFICATE OF CONFORMANCE

Product Safety Review

Wyle Project No. T71013-06
Customer PO ES&S-MSA-TA029
Issue Date 22 October 2013

The device identified below has been reviewed in accordance with the specific requirements of applicable sections of UL60950-1, Standard for Safety for Information Technology Equipment, Second Edition, and the Recommended Practice for Unlabeled Electrical Equipment Evaluation, First Edition, (developed by the American Council for Electrical Safety), and has been found to be in compliance with these requirements.

| Product Identification | |
|---|---|
| Device Description | Voting Device |
| Manufacturer | Election Systems & Software |
| Device Model No. | ExpressVote |
| Device Serial No. | EV0113350037 |
| Electrical Ratings | Input 110-240 VAC – 3A |
| Hardware Revision | 1.0 |
| **Power Supply** | |
| Power Supply Description | ITE Power Supply |
| Manufacturer | Mega Electronics, Inc. |
| Model No. | PW080A2-1Y24AP |
| Part No. | MD-24066 |
| Serial No. | MD-24066-ES |
| Input | 100-240 VAC (50-60 Hz) – 2.2A Max. |
| Output | 24 VDC – 6.6A |
| UL Listed ITE PS | UL File No. E308433 |

This report is valid for the equipment model and serial numbers indicated in the product identification table above. Wyle makes no endorsement of the equipment reviewed, nor does this evaluation constitute approval of similar equipment. This evaluation does not constitute a product listing.

Brian Coppock 10/22/13
Brian Coppock NCT, Product Safety Supervisor
iNARTE Certified Product Safety Technician No. PS-00438-NCT

Robert D. Hardy 10/22/13
Robert D. Hardy, Department Manager
EMI/EMC/FCC, Product Safety, Election Systems, & Packaging

ATTACHMENT G

INSTRUMENTATION EQUIPMENT SHEETS

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/1/2013 JOB NUMBER: T71013 TYPE OF TEST: FCC PART 15

TECHNICIAN: J. SMITH CUSTOMER: ES&S TEST AREA: OATS 2

| No. | Description | Manufacturer | Model | Serial # | Wyle # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ANTENNA | ELECTROMETRIC | EM-6917A-1 | 2410/6 | 103115 | 30MHZ - 3GHZ | SEE DATA | 9/11/2013 | 9/11/2015 |
| 2 | ATTENUATOR | NARDA | 766-20 | 740580 | 00443 | DC-4 GHz | MFG | 3/25/2012 | 3/25/2014 |
| 3 | EMI TEST RCVR | ROHDE SCHWARZ | ESCI | 100388 | 103503 | MULTI | MFG | 4/1/2013 | 4/1/2014 |
| 4 | LISN | SOLAR | 2/107-50-TS-50-N | 1125262 | 01682 | MFG | MFG | 8/7/2012 | 8/7/2014 |
| 5 | LISN | SOLAR | 2/107-50-TS-50-N | 1125263 | 01683 | MFG | MFG | 8/7/2012 | 8/7/2014 |
| 6 | TAPE MEASURER | LUFKIN | 8L135I | 116893 | 116893 | 1 meter | 1 mm | 7/12/2011 | 7/12/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 10-1-13 CHECKED & RECEIVED BY: 10/1/2013

Q.A.: 10/01/2013

WH-1029A,REV.APR'99 Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 9/18/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG 4.1.2.12 MFI

TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: EMI EXT CHAMBER#3

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AMPLIFIER | TECHRON | 7560 | 015075 | 04566 e | 600W | NCR | 7/8/2008 | 7/8/2020 |
| 2 | DATALOGGER | EXTECH | 42280 | 9051859 | 04926 e | -4°F to 144°F/0- | ±1°F / ±3%RH | 5/14/2013 | 5/14/2014 |
| 3 | DMM | FLUKE | 87 | 78770390 | 116830 e | MULTI | 10.13641 | 7/16/2013 | 7/16/2014 |
| 4 | METER | HOLADAY | HOL-HD3604 | 76285 | 117549 e | 30-2KHz | MFG | 2/24/2012 | 2/24/2014 |
| 5 | STOP WATCH | HANHART | STRATOS1 | 110131 | 110131 e | 30HR | 5 sec/day | 6/26/2013 | 6/26/2014 |
| 6 | TAPE MEASURER | LUFKIN | HV1049CME | NSN | 02710 e | 25/8meters | ±1in / ±1mm | 5/30/2013 | 5/30/2015 |
| 7 | WAVE GEN | AGILENT | 33250A | 5904000026 | 014181 e | MULTI | CERT | 12/18/2012 | 12/26/2013 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 9/18/13 Q.A.: CHECKED & RECEIVED BY: 09/18/2013 9/18/13

WH-1029A,R5V,APR99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/2/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG SEC 4.1.2.5 (EPD)
TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: EXT EMI CHAMBER#3

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | DATALOGGER | ENTECH | 42280 | 9051859 | 04926* | -4°F to 144°F/0- | ±1°F/±2%RH | 5/14/2013 | 5/14/2014 |
| 2 | DMM | FLUKE | 87 | 18290044 | 01472* | 4VDC | ±0.1%rd | 12/6/2012 | 12/6/2013 |
| 3 | POWER SOURCE | CALIFORNIA INST | 1251P/232 | L06527 | 115806* | 100-240VAC@ | ±2%FS | 2/6/2013 | 2/6/2014 |
| 4 | TAPE MEASURER | LUFKIN | HV1013CME | NSN | 02708 * | 8meters | 1/8in | 4/24/2012 | 4/24/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 10/2/13 CHECKED & RECEIVED BY: 10/02/2013 Q.A. 10/2/13

WH-1029A,REV.APR'99 Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/8/2013 JOB NUMBER: 77103 TYPE OF TEST: MIL-STD-461E RS103 WORK

TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: SEMI LAB CHAMBER 3

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AMPLIFIER | AMP RESEARCH | 500W1000A | 22368 | 03841 | [illegible] | MFR | 8/29/2013 | 8/29/2014 |
| 2 | ANTENNA | AR | AT1000 | 0410579 | 07547 | [illegible] | MFR | 1/30/2013 | 1/30/2014 |
| 3 | DATA ODDTR | EXTECH | 42253 | 9551859 | 04026 | [illegible] | MFC | 8/14/2013 | 8/14/2014 |
| 4 | DIR COUPLER | AR | DC2018A | 311891 | 01484 | [illegible] | MFC | 9/9/2013 | 9/9/2014 |
| 5 | DMM | FLUKE | 87V | 83950146 | 04474 | [illegible] | [illegible] | 12/5/2012 | 12/5/2013 |
| 6 | ISOTROPIC PROBE | AMP RESEARCH | FP2000 | 2037 | 03757 | [illegible] | [illegible] | 11/9/2012 | 11/9/2013 |
| 7 | SIGGEN | AEROFLEX | 2023A | 202330048 | 03039 | [illegible] | MFC | 10/23/2012 | 10/23/2013 |
| 8 | SPEC ANAL | AGILENT | E4448A | MY46183480 | 08040 | [illegible] | MFC | 4/5/2013 | 4/16/2014 |
| 9 | STOP WATCH | HAMHART | STRATOSH | 16102 | 15102 | [illegible] | [illegible] | 9/19/2013 | 9/19/2014 |
| 10 | TAPE MEASURE | LUFKIN | HV1048CME | N/A | 09716 | [illegible] | [illegible] | 5/19/2013 | 5/19/2015 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards which calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: CHECKED & RECEIVED BY: 10/8/2013

WI-I029A,REV.A,FF09 Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 9/23/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG 4.2.11 (CRFI)
TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: EMI CHAMBER#3

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AMPLIFIER | AMP RESEARCH | 500A100A | 0324951 | 04816 | 10kHz-100MHz | NCR | 8/12/2013 | 8/12/2014 |
| 2 | ATTEN | BIRD | 25-T-MN | 0129 | 03142 | 50 OHMS 25 W. | MFG | 6/24/2013 | 6/24/2014 |
| 3 | ATTENUATOR | NARDA | 769-6 | 03180 | 04800 | DC to 6GHz | MFG | 5/25/2013 | 5/25/2014 |
| 4 | DATALOGGER | EXTECH | 42280 | 5051859 | 04926 | -4°F to 144°F/0- | ±1°F / ±3%RH | 5/14/2013 | 5/14/2014 |
| 5 | DIR COUPLER | AR | DC2010A | 311894 | R11894 | 10KHZ-1GHZ | MFG | 9/5/2013 | 9/5/2014 |
| 6 | PASSIVE | FISHER CC | FCC-801-150-50-CDI | D4048/04050 | 110405 | 150KHZ - 230M | MFG | 7/20/2012 | 7/20/2014 |
| 7 | SIG GEN | AEROFLEX | 2023A | 202308/008 | R202308 | 9KHz-1.2GHz | MFG | 10/23/2012 | 10/23/2013 |
| 8 | SPEC ANAL | AGILENT | E4446A | MY46180335 | R80335 | MFG | MFG | 6/10/2013 | 6/10/2014 |
| 9 | SPEC ANAL | ROHDE SCHWARZ | FSP30 | 100882 | 112804 | 9kHz to 30GHz | MFG | 10/3/2012 | 10/3/2013 |
| 10 | STOP WATCH | HANHART | STRATOS1 | 110131 | 110131 | 10HR | 5 sec/day | 6/24/2013 | 6/24/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 9/23/13 CHECKED & RECEIVED BY: 09/23/2013

QA: 9/23/13

WH-1029A,REV,APR'99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 09/1/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG SECTION 4.1.2.7 (LSI)

TECHNICIAN: R.CHAMBERS CUSTOMER: ES&S TEST AREA: EXT EMI CHAMBER#3

| No | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | COUPL NETWK | HAEFELY TRENCH | PCD100 | B9886 | B90540 | MFG | MFG | 7/10/2013 | 7/10/2015 |
| 2 | DATALOGGER | GUTH | 4220 | 905 859 | 04996 | -40°to 144°F(0 | ±1°F/±5%RH | 2/14/2013 | 8/14/2014 |
| 3 | IMPULSE MODULE | HAEFELY TRENCH | PIM100 | 3103 | B90538 | 6kV | MFG | 7/10/2013 | 7/10/2015 |
| 4 | OSCILLOSCOPE | TEKTRONIX | DPO5104 | C042091 | 01237 | MFG | MFG | 10/23/2012 | 10/23/2013 |
| 5 | STOP WATCH | HANHART | STRATOS1 | 110131 | 110131 | 10Hz | 5 sec/day | 6/24/2013 | 6/24/2014 |
| 6 | SURGE TSTR | HAEFELY TRENCH | ISURGE8/700 | 130230 | B90127 | MULTI | MFG | 7/10/2013 | 7/10/2015 |

This is to certify that the above instruments were calibrated using state of the art techniques with standards which are traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: [signature] 10/1/13 CHECKED & RECEIVED BY: [signature] 10/01/2013

QA: [signature] 10/1/13

WI-1029A,REV.APP99

Page 1 of 1

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/11/2013 JOB NUMBER: T71013 TYPE OF TEST: VVSG SEC 4.7.1
TECHNICIAN: R.CHAMBERS CUSTOMER: ESES TEST AREA: CHAMBER 5I

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | DMM | FLUKE | 87V | 18250046 | 01474 | 4VOC | ±0.1%+1 | 12/6/2012 | 12/6/2013 |
| 2 | POWER SOURCE | CALIFORNIA INST | 1251IP/IE | 106351 | 117347 | 0-420VAC RMS | 1% | 2/20/2013 | 2/20/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: [signature] 10/11/13 Q.A.: CHECKED & RECEIVED BY: [signature] 10/11/13 Brenda Mabee 10/11/13

W04-1029A,REV.A,PF'99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/11/2013 JOB NUMBER: T71013 TYPE OF TEST: TEMP/POWER

TECHNICIAN: T TURNER CUSTOMER: ES&S TEST AREA: CHAMBER 51A

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | TEMP | MIDISTAR | 82a 611 | 10653 | 116418 | -400/2000°F | 1%FS | 12/5/2012 | 12/5/2013 |
| 2 | TEMP IND | NEWPORT | Q2001TC | N/A | 116533 | TYPE T | 0.5% | 12/5/2012 | 12/5/2013 |
| 3 | TEMP RECORDER | HONEYWELL | DR130T | 0244885050 | 109830 | -200/600°F | 4°F | 12/5/2012 | 12/5/2013 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: Clarence Jones 10/11/13 CHECKED & RECEIVED BY: 10/11/13

Q.A.: Brenda Mora 10/11/13

WH-1029A,REV.A,APR99

Page 1 of 1

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/15/2013 IDENTIFIER: T71379 TYPE OF TEST: RECORDED DUST

TECHNICIAN: E.TURNER SYSTEM: FS45 TEST AREA: CHAMBER #6

| No. | Description | Manufacturer | Model | Serial | Cal Date | Cal Due |
|---|---|---|---|---|---|---|
| 1 | TRANSMITTER | EXCAL | CT4520AR | 112332 | 9/9/2013 | 9/9/2014 |
| 10 | DAC IV | DAYTRONIC CORP | 3000 | 100116 | 1/25/2013 | 1/25/2014 |
| 3 | STOPWATCH | ESTECH | 30510 | N/N | 1/15/2013 | 1/15/2014 |
| 4 | TEMP/DEWPOINT | WILLOW | 4101 | NA | 1/22/2013 | 1/22/2014 |
| 5 | TEMP | WILLOW | UP4TESE | 120436 | 1/22/2013 | 1/22/2014 |
| 6 | TEMP RECORDER | HONEYWELL | DR4500 | 4309100310 | 1/22/2013 | 1/22/2014 |

This is to certify that the above instruments were calibrated using standards traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: [signature] 10/15/13 CHECKED & RECEIVED BY: [signature] 10/15/13

W.I. 10059A REV A 2009 Q.A. [signature] 10/15/2013

Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/4/2013 JOB NUMBER: T71013 TYPE OF TEST: RAIN EXPOSURE

TECHNICIAN: T.TURNER CUSTOMER: SSAS TEST AREA: ENV LAB

| No. | Description | Manufacturer | Model | Serial # | WYLE # | Range | Accuracy | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | STOPWATCH | LASCAR | X2515 | NSN | 00230 | 60M | 1 second | 12/19/2012 | 10/1/2014 |
| 2 | TAPE MEASURE | LUFKIN | W706 | NSN | 00148 | 25' | 1/32" | 12/1/2012 | 10/1/2013 |

This is to certify that the above instrument was calibrated using state-of-the-art methods with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION CHECKED & RECEIVED BY: 10/4/13

QA: 10/4/13

WHI-MOSA.E (V. 4/2009) Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 4/23/01 J WO/ENGR: T71013.01 TYPE OF TEST: VIBRATION

TECHNICIAN: C.TERNON CUSTOMER: ES&S VOTING SYSTEMS TEST AREA: DYN LAB

| EQ. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Last Calib. | Calib Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ACCELEROMETER | [illegible] | 7274A-50 | 3673 | 68599 | 10 pC/g (TAP) | +5% | 9/16/2013 | 9/16/2014 |
| 2 | CHARGE | [illegible] | 4515 | ALEX | 180282 | GAIN | +1.5% | 4/16/2013 | 10/16/2014 |
| 3 | DMM | [illegible] | 45 | 3952139 | 114297 | MULT | 1.00% | 6/25/2013 | 6/25/2014 |
| 4 | VIB CONTROL | SPECTRAL DYN | 2830-5700-1 | 2430-1256 | 113719 | MULT | MULT | 10/4/2013 | 10/4/2014 |

This is to certify that the above listed equipment has been calibrated in accordance with standard calibration procedures traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: C Ternon 4-23-01 CHECKED & APPROVED BY: [signature] 4/23/01

TITLE: [signature]

FORM A, REV. A 1299 Page 3 of 3

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE 9/30/03 SCHEDULE#: T71013.01 TYPE OF TEST: HOT/COLD/SMP

TECHNICIAN: LARRY IVEY CUSTOMER: EXAS TEST AREA: 85-9 CHAMBER #1

| No. | Description | Manufacturer | Model | Serial | WYLE # | RANGE | ACCURACY | CALIBR. | Cal. Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | TEMP ALARM | THERMO-KAL | T1051-KAL-RIM | N/ITS | 72302 | TYPE T | +1°C | 12- OCT- 3 | 12/10/2003 |
| 2 | TEST | THERMOTRON | 8200 | 32079 | 72401 | 125/325°F | 5/35 | 12- OCT- 3 | 12/10/2003 |
| 3 | TEMP RECORDER | HONEYWELL | 194501 | 4070-0370-0 | 72400 | 0-50 A/C/F | +1% | 12- OCT- 3 | 12/10/2003 |

This is to certify that the above instruments were calibrated using procedures/techniques which are directly traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: [signature] CHECKED & REVIEWED BY: [signature] Last Revised 4/30/03

Q.A.: [signature] 9/30/03

WYLE 1205A (REV. APR. 92) Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 12/1/2015 JOB NUMBER: T71013 TYPE OF TEST: LOW TEMP

TECHNICIAN: HARDMAN CUSTOMER: OSAS TEST AREA: CH11

| No. | Description | Manufacturer | Model | Serial | WYLE# | Range | Accuracy | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | TEMP AL 1854 | THERMOTRON | THERMAL ARM | 95316 | 03422 | TYPE T | 1% | 12/1/2015 | 12/1/2016 |
| 2 | TEMP | THERMOTRON | 4800 | 95779 | 03681 | -25 350°C | 2°C | 12/1/2015 | 12/1/2016 |
| 3 | TEMP/HUMIDITY | ESPEC/WEST | LHU-113 | 17-7183-0001 | 12250 | -100 150°C | 1°C | 12/1/2015 | 12/1/2016 |

This is to certify that the above instruments were calibrated using standards traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 12-1-15 CHECKED & RECEIVED BY: 12/1/15

QA: 12/1/15

WEI 1004A (REV. AUG 2014) Page 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

wyle laboratories

**INSTRUMENTATION EQUIPMENT SHEET**

DATE: WEW201 PROJECT NO.: T71013.0 TYPE OF TEST: TEMPHUM

TECH. CAL: LARRY IVEY CUSTOMER: ESES TEST AREA: ENVCHAMBER 19

| # | Description | Manufacturer | Model | Serial # | Cal Due |
|---|---|---|---|---|---|
| | CHAMBER CONTROLLER | HONEYWELL | DR7500 | 0509VS0003 | 03/20/14 |
| 2 | TEMP SENSOR | TURBO UNION | THERM-STAR V | n/a | 03/20/14 |
| 3 | TEMP | TURBO UNION | 42.0 | n/a | 03/20/14 |

This is to certify that the above listed equipment was tested using state of the art techniques and standards of current accepted procedures traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: _____ DATE: 9-23-13 CHECKED & APPROVED BY: _____

QA: _____ DATE: _____

Rev 1.0.1

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

| No. | Description | Manufacturer | Model | Serial | Range | Accuracy | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|
| 1 | [illegible] | CALIFORNIA INST. | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 2 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 3 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 4 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

This is to certify that the above data were recorded using state-of-the-art techniques and standards which are traceable to the National Institute of Standards and Technology.

INSTRUMENTATION [illegible] CHECKED & RECEIVED BY [illegible] 11/20/13

WR: 129.4, RFV, APR 05

Page 1 of 1

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 11/8/2013 SO NUMBER: T71013 TYPE OF TEST: VVS/FSEC 4.7.1

TECHNICIAN: ALAN SIMMONS CUSTOMER: 6563 TEST AREA: CHAMBER 31

| No. | Description | Model Number | Mfg | Serial # | Wyle # | Range | Accuracy | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| | OHM | | | | | | | | |
| | POWER SOURCE | CALIFORNIA AST | | | | | | | |

This is to certify that the above instruments were calibrated as stated and that calibration was performed in accordance with standards traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: Alan Simmons 11-11-13

CHECKED & RECEIVED BY: Alan Simmons 11-11-13

WYLE QUALITY REPRESENTATIVE: for Nov 11, 2013

Sht 1 of 1

WYLE LABORATORIES, INC.
Huntsville Facility

# APPENDIX D

# FUNCTIONAL CONFIGURATION AUDIT (FCA) ISSUES REPORT

| ID | Category | Status | Summary |
|---|---|---|---|
| 107 | FCA | closed | Message displayed when attempting to generate hash of Firmware/OS/Bootloader with Include Graphics Option checked. "ExpressVote General Error. Unknown Error occurred. Please Contact an Election Official. An Error has occurred." |
| 126 | FCA | closed | Open Primary: Voting in more than one party's contests caused candidates to display as selected, but not print. |
| 134 | FCA | closed | When attempting to print a ballot image in ElectionWare, if a new printer is selected when attempting to print ballot images, the image will print to the previously selected printer. |
| 139 | FCA | closed | When attempting to print a ballot image in ElectionWare, pressing the "X" button to close the printer window causes the image to be printed anyways. |
| 140 | FCA | closed | Enable/Disable BOL Scanning option is stated incorrectly in the system log as "Bypass Graphics/Audio Check Option Enabled/Disabled." |
| 141 | FCA | closed | For DS200 tabulation in ERM, the option "Update DS200 Results from SFTP" is not greyed out. |
| 142 | FCA | closed | The DS200 was incorrectly displaying the ballot counts for the ExpressVote cards on the QR Status Code screen. The ExpressVote cards were being counted as DS200 ballots after the polls were closed. |

# APPENDIX E

# TECHNICAL DATA PACKAGE (TDP) ISSUES REPORT

| ID | Category | Status | Summary |
|---|---|---|---|
| 89 | TDP | closed | EVS5200_SMM00_DS200 |
| 90 | TDP | closed | EVS5200_SMM00_DS200, Chapter 7, pg. 30 & pg. 31 |
| 91 | TDP | closed | EVS5200_DOC_D_1200_ChangeNotes |
| 92 | TDP | closed | EVS5200_SOP00_ExpressVote, pg. 241 & 242 |
| 93 | TDP | closed | EVS5200_SSS00 |
| 94 | TDP | closed | EVS5200_SOP00_ELS |
| 95 | TDP | closed | EVS5200_SOP00_ElectionWare04_Deliver |
| 96 | TDP | closed | EVS5200_SDS00_ERM |
| 97 | TDP | closed | EVS5200_SDS00_ERM01_Appendices |
| 98 | TDP | closed | EVS5200_P_D_0500_UsabilityTestReports |
| 99 | TDP | closed | EVS5200_SMM00_ExpressVote, To Set the Serial Number, pg. 25-26 |
| 100 | TDP | closed | EVS5200_SMM00_ExpressVote, Chapter 3: System Maintenance Menu |
| 101 | TDP | closed | EVS5200_SMM00_ExpressVote, Changing Battery, pg. 70 |
| 102 | TDP | closed | EVS5200_SMM00_ExpressVote, pg. 70-71 |
| 103 | TDP | closed | EVS5200_SMM00_ExpressVote, Front Cover |
| 104 | TDP | closed | EVS5200_C_D_0100_SysOvr: Attachment 2, Voting System Summary: page "1" (pdf page 54) |
| 105 | TDP | closed | EVS5200_C_D_0100_SysOvr: Attachment 2, Voting System Summary: page "6" (pdf page 59) |
| 106 | TDP | closed | EVS5200_C_D_0100_SysOvr: Attachment 2, Voting System Summary: Voting System Equipment. |
| 108 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, (for example, pgs. 23,112) |
| 109 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Chapter 12: User Acceptance Checklist, pg. 30 |
| 110 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, TABLE 27, Placement of ExpressVote Security Seals, pg. 77 |
| 111 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Ballot Boxes, pg. 76 |
| 112 | TDP | closed | EVS5200_CM_SPC00_SysSecuritySpec |
| 113 | TDP | closed | EVS5200_CM_SPC00_SysSecuritySpec, sections 1.2.5, 1.4.6, 3.3.2.2, & 3.3.4.2 |
| 114 | TDP | closed | EVS5200_CM_SPC00_SysSecuritySpec, Section 3.3.2.2 pg. 48 |
| 115 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Securing the ExpressVote Unit, Reference, pg. 75 |
| 116 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Securing the ExpressVote Unit, pg. 75 |
| 117 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Securing the ExpressVote Unit, pg. 75 |
| 118 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, throughout document |
| 119 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, TABLE 32: Glossary, pg. 122 |
| 120 | TDP | closed | Multiple documents. There are several references to a lockable "rear" paper chute access door on the ExpressVote. |
| 121 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Election Day Security, pg. 230 & EVS5200_CM_SPC00_SysSecuritySpec, ExpressVote Spec Sheet |
| 122 | TDP | closed | ExpressVoteHW_M_SPC_0310_HWSpec, I.4.1.4.1.a (pg. 12) |
| 123 | TDP | closed | EVS5200_DOC_SOP_12_EW04Deliver, Chapter 3: DS/ExpressVote Security, pg. 10 |
| 124 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Chapter 6, Setting the Maintenance Security Code, pg. 54 |
| 125 | TDP | closed | EVS5200_DOC_SOP_12_EW04Deliver, Chapter 3: DS/ExpressVote Security, pg. 10 |
| 127 | TDP | closed | EVS5200_DOC_SOP_11_EW01Admin Set User Password Policies pgs. 49 & 111 |
| 128 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Clear and Initialize ExpressVote, Step 7, pg. 89 |
| 129 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Installing & Removing the Election Media Device, pg. 123 |
| 130 | TDP | closed | EVS5200_C_D_0100_SysOvr, SpecSheet_ExpressVote_HWv.1.0, (pdf pg. 60) |
| 131 | TDP | closed | EVS5200_DOC_SOP_ExpressVote, Firmware/OS/Bootloader - Export to Media, pg. 67 |
| 132 | TDP | closed | EVS5200_DOC_SOP_ExpressVote |
| 133 | TDP | closed | EVS5200_DOC_SOP_EW01Admin, Chapter 9: Getting Started, Start ElectionWare, pg. 23 |
| 135 | TDP | closed | EVS5200_DOC_SOP_ExpressVote |
| 136 | TDP | closed | ExpressVoteHW_M_SPC_0310_HWSpec |
| 137 | TDP | closed | EVS5200_DOC_SOP_EW04Deliver, Chapter 4: AutoMARK Security, pg. 13 |
| 138 | TDP | Closed | Remove all references to M100 and M650 in multiple docs |

# APPENDIX F

# NOTICES OF ANOMALY

wyle laboratories

| NOTICE OF ANOMALY | DATE: 02/18/2014 | |
|---|---|---|
| Notice No: 1 | P.O. Number: TA037 | Contact No: N/A |
| Customer: ES&S | | Wyle Job Number: T71379.01 |
| Notification Made To: Sue McKay | | Notification Date: 2/18/14 |
| Notification Made By: Stephen Han | | Via: Email |
| Category: ☒Specimen ☐Procedure ☐Test Equipment | | Date of Anomaly: 01/28/14 |
| Part Name: ExpressVote | | Part Number: |
| Test: Usability and Accessibility | | Serial/ID Number: EV0113350025 |
| Specification: 2005 VVSG Volume I | | Paragraph/Section Number: 3.1.6 d i |

**REQUIREMENTS: 2005 VVSG Volume I section 3.1.6.d i**

The voting process shall be designed to minimize interaction difficulties for the voter.

d. Input mechanisms shall be designed to minimize accidental activation.

i. On touch screens, the sensitive touch areas shall have a minimum height of 0.5 inches and minimum width of 0.7 inches. The vertical distance between the centers of adjacent areas shall be at least 0.6 inches, and the horizontal distance at least 0.8 inches.

**DESCRIPTION OF ANOMALY:**

The horizontal distance between the centers of the keys on touch screen keyboard was less than 0.8 inches.

**DISPOSITION * COMMENTS * RECOMMENDATIONS:**

The final disposition is pending a root cause analysis to be presented by the client.

| | | |
|---|---|---|
| Potential 10 CFR Part 21 | ☐Yes ☒No | |
| Responsibility to analyze anomalies and comply with 10 CFR PART 21 | ☐ Customer | ☒ Wyle |
| CAR Required: ☐Yes ☒No | CAR Number: | |

**VERFICATION**

| | |
|---|---|
| Test Witness: | Project Engineer: 2/18/14 |
| Representing: | Project Manager: 2/18/14 |
| Quality Assurance: Brenda Mann 2/19/14 | |

WH-1066, Rev. MAR '09

Page 1 of 1

wyle laboratories

| NOTICE OF ANOMALY | | DATE: 02/18/2014 ORIGINAL |
|---|---|---|
| Notice No: 2 | P.O. Number: TA037 | Contact No: N/A |
| Customer: ES&S | | Wyle Job Number: T71379.01 |
| Notification Made To: Sue McKay | | Notification Date: 2/18/14 |
| Notification Made By: Stephen Han | | Via: Email |
| Category: ☒Specimen ☐Procedure ☐Test Equipment | | Date of Anomaly: 01/29/14 |
| Part Name: ExpressVote | | Part Number: |
| Test: Acoustic Noise Level and Hearing Aid Compatibility | | Serial/ID Number: EV0113350052 |
| Specification: 2005 VVSG Volume I | | Paragraph/Section Number: 3.2.2.2 c vi |

**REQUIREMENTS: 2005 VVSG Volume I section 3.1.6.d i**

The accessible voting station shall be accessible to voters who are blind.

c. All voting stations that provide audio presentation of the ballot shall conform to the following requirements:

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.

**DESCRIPTION OF ANOMALY:**

The ExpressVote would not allow the user to decrease the volume at the start of each voting session.

**DISPOSITION * COMMENTS * RECOMMENDATIONS:**

The final disposition is pending a root cause analysis to be presented by the client.

| | | |
|---|---|---|
| Potential 10 CFR Part 21 | ☐Yes ☒No | |
| Responsibility to analyze anomalies and comply with 10 CFR PART 21 | ☐ Customer | ☒ Wyle |
| CAR Required: ☐Yes ☒No | CAR Number: | |

**VERFICATION**

| | |
|---|---|
| Test Witness: | Project Engineer: Stephen H 2/18/14 |
| Representing: | Project Manager: Frank Pabst 2/18/14 |
| Quality Assurance: Brenda Mease 2/18/14 | |

WH-1066, Rev. MAR '09

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

| NOTICE OF ANOMALY | | DATE: 04/09/2014 |
|---|---|---|
| Notice No: 3 | P.O. Number: TA037 | Contact No: N/A |
| Customer: Election Systems and Software (ES&S) | | Wyle Job Number: T71379.01 |
| Notification Made To: Sue McKay | | Notification Date: 04/09/2014 |
| Notification Made By: Stephen Han | | Via: Email |
| Category: ☒Specimen ☐Procedure ☐Test Equipment | | Date of Anomaly: 04/09/2014 |
| Part Name: EVS 5.2.0.0 | | Part Number: N/A |
| Test: TDP Review | | Serial/ID Number: N/A |
| Specification: 2005 VVSG Volume I | | Paragraph/Section Number: Section 2 |

**REQUIREMENTS:**

The EVS 5.2.0.0 Voting System Technical Data Package (TDP) shall be reviewed for accuracy, completeness, and compliance to the EAC 2005 VVSG.

**DESCRIPTION OF ANOMALY:**

Review of the summited documentation revealed discrepancies between the TDP and the EAC 2005 VVSG requirements. Functional testing also identified text in the TDP that conflicted with the actual operations of the system. Each noted discrepancy was documented in detail in the Wyle generated TDP issues matrix that is on file as raw data.

**DISPOSITION * COMMENTS * RECOMMENDATIONS:**

EVS 5.2.0.0 is a Modification of a previously certified system. As such the TDP was only reviewed where modified or where impacted by system modification. ES&S corrected each nonconformance observation and resubmitted the associated documents for review. This process continued until it appeared that the TDP complied with all applicable requirements.

| | | |
|---|---|---|
| Potential 10 CFR Part 21 ☐Yes ☒No | | |
| Responsibility to analyze anomalies and comply with 10 CFR PART 21 ☐ Customer ☐ Wyle | | |
| CAR Required: ☐Yes ☒No | CAR Number: | |

**VERFICATION**

| | |
|---|---|
| Test Witness: None | Project Engineer: 4-9-14 |
| Representing: N/A | Project Manager: 4/10/14 |
| Quality Assurance: 4/10/14 | |

WH-1066, Rev. MAR '09

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

| NOTICE OF ANOMALY | | DATE: 04/09/2014 |
|---|---|---|
| Notice No: 4 | P.O. Number: TA037 | Contact No: N/A |
| Customer: Election Systems and Software (ES&S) | | Wyle Job Number: T71379.01 |
| Notification Made To: Sue McKay | | Notification Date: 04/09/2014 |
| Notification Made By: Stephen Han | | Via: Email |
| Category: ☒Specimen ☐Procedure ☐Test Equipment | | Date of Anomaly: 04/09/2014 |
| Part Name: EVS 5.2.0.0 | | Part Number: N/A |
| Test: Source Code Review | | Serial/ID Number: N/A |
| Specification: 2005 VVSG Volume I | | Paragraph/Section Number: 5 |

**REQUIREMENTS:**

**2005 VVSG Volume I section 5**

Software used in voting systems shall meet the essential design and performance characteristics detailed in Section 5 of the EAC 2005 VVSG.

**DESCRIPTION OF ANOMALY:**

Review of the submitted source code modules comprising the EVS 5.2.0.0 system revealed deviations from the standard. These anomalies are documented in detail in the Wyle generated review reports on file as raw data.

**DISPOSITION * COMMENTS * RECOMMENDATIONS:**

Upon completion of the review for each source code submission, a technical summary report of all identified standards violations was sent to ES&S for resolution. ES&S then corrected the reported violations and re-submitted the source code for re-review. This process was repeated as many times as necessary until all identified standards violations were corrected.

| | | |
|---|---|---|
| Potential 10 CFR Part 21 | ☐Yes ☒No | |
| Responsibility to analyze anomalies and comply with 10 CFR PART 21 | ☐ Customer ☐ Wyle | |
| CAR Required: ☐Yes ☒No | CAR Number: | |

**VERFICATION**

| | |
|---|---|
| Test Witness: None | Project Engineer: 4/9/2014 |
| Representing: N/A | Project Manager: 4/10/14 |
| Quality Assurance: 4/10/14 | |

WH-1066, Rev. MAR '09

Page 1 of 1

NTS
HUNTSVILLE OPERATIONS

| NOTICE OF ANOMALY | DATE: 04/14/2014 ORIGINAL | |
|---|---|---|
| Notice No: 5 Rev A | P.O. Number: TA037 | Contact No: N/A |
| Customer: Election Systems and Software (ES&S) | | Wyle Job Number: T71379.01 |
| Notification Made To: Sue McKay | | Notification Date: 04/14/2014 |
| Notification Made By: Stephen Han | | Via: Email |
| Category: ☒Specimen ☐Procedure ☐Test Equipment | | Date of Anomaly: 04/09/2014 |
| Part Name: EVS 5.2.0.0 | | Part Number: N/A |
| Test: FCA | | Serial/ID Number: N/A |
| Specification: 2005 VVSG Volume II | | Paragraph/Section Number: 6.7 |

**REQUIREMENTS:**

A Functional Configuration Audit (FCA) of the EVS 5.2.0.0 system shall be performed in accordance with Section 6.7 of Volume II of the VVSG. The purpose of the FCA is to verify that the system performs as documented in the ES&S-supplied technical documentation during the EVS 5.2.0.0 test campaign.

**DESCRIPTION OF ANOMALY:**

During performance of the FCA of EVS 5.2.0.0, Wyle discovered 7 discrepancies related to system functionality.

1. Message displayed when attempting to generate hash of Firmware/OS/Bootloader with Include Graphics Option checked. "ExpressVote General Error. Unknown Error occurred. Please Contact an Election Official. An Error has occurred."
2. Open Primary on the ExpressVote: Voting in more than one party's contests causes candidates to display as selected, but not print.
3. When attempting to print a ballot image in ElectionWare, if a new printer is selected when attempting to print ballot images, the image will print to the previously selected printer.
4. When attempting to print a ballot image in ElectionWare, pressing the "X" button to close the printer window causes the image to be printed anyways.
5. Enable/Disable BOL Scanning option is stated incorrectly in the system log as "Bypass Graphics/Audio Check Option Enabled/Disabled."
6. For DS200 tabulation in ERM, the option "Update DS200 Results from SFTP" is not greyed out.
7. The DS200 was incorrectly displaying the ballot counts for the ExpressVote cards on the QR Status Code screen. The ExpressVote cards were being counted as DS200 ballots after the polls were closed.

**DISPOSITION * COMMENTS * RECOMMENDATIONS:**

Upon completion of the review for each source code submission, a technical summary report of all identified standards violations was sent to ES&S for resolution. ES&S then corrected the reported violations and re-submitted the source code for re-review. This process was repeated as many times as necessary until all identified standards violations were corrected.

| | | |
|---|---|---|
| Potential 10 CFR Part 21 | ☐Yes ☒No | |
| Responsibility to analyze anomalies and comply with 10 CFR PART 21 | ☐ Customer ☐ Wyle | |
| CAR Required: ☐Yes ☒No | CAR Number: | |

**VERFICATION**

| | |
|---|---|
| Test Witness: None | Project Engineer: 4/14/14 |
| Representing: N/A | For Project Manager: 4/14/14 |
| Quality Assurance: Brenda Moore 4/14/14 | |

WI-1066, Rev. MAR '09

Page 1 of 1

# APPENDIX G

# WARRANT OF ACCEPTING CHANGE CONTROL RESPONSIBILITY

Election Systems & Software

## Warrant of Accepting Change Control Responsibility

Election Systems & Software, Inc. (ES&S) understands its responsibility to ensure that any system bearing the U.S Election Assistance Commission (EAC) mark of certification, or otherwise represented as EAC certified, is configured consistent with the system certified by the EAC and EAC certification documentation. Specifically, it is warranted that any EVS 5.2.0.0 voting systems subsequently delivered to a customer after receiving EAC certification (as an EAC Certified System) will meet all configuration requirements at the time of delivery as set forth by EAC's certified documentation. It is further warranted that any fielded system modified by ES&S for the purposes of becoming an EAC certified system will also meet the configuration requirements as set forth by the same certification documentation. Voting system configurations tested and certified by the EAC may contain alternative configurations composed of varying, approved components.

Modifications inconsistent with the EAC's Certification documentation shall not be made by ES&S, unless authorized by the EAC as a de minimis change (per Section 3.5 of the Voting System Testing and Certification Program Manual) or a certified modification (per section 3.4.3 of the Voting System Testing and Certification Program Manual).

Attested by: Election Systems & Software, Inc.

Signed Sue McKay Date: 4/4/14

Printed Sue McKay Date: 4/4/14



*"Maintaining Voter Confidence. Enhancing the Voting Experience."*
11208 John Galt Boulevard • Omaha, NE 68137 USA • Phone: 402.593.0101 • Toll-Free: 1.800.247.8683 • Fax: 402.593.8107
• www.essvote.com

# APPENDIX H

# ES&S ATTESTATION OF DURABILITY

Election Systems & Software

December 19, 2013

Mr. Frank Padilla
Wyle Laboratories
7800 Madison Blvd
Huntsville, AL 35806

Dear Mr. Padilla:

This letter is the attestation of Election Systems & Software (ES&S) relative to 2005 VVSG Volume I – Section 4.3.2, regarding the durability of the voting system in keeping with the conclusion of EAC RFI 2008-05.

ES&S attest that the EVS 5.2.0.0 system under test was designed to withstand normal use without deterioration and without excessive maintenance costs for a period of ten years.

Do not hesitate to contact me if you have any question regarding this attestation.

Sincerely,

Sue McKay

Sue McKay
Director of Certification

"Maintaining Voter Confidence, Enhancing the Voting Experience."
11208 John Galt Boulevard • Omaha, NE 68137 USA • Phone: 402.593.0101 • Toll-Free: 1.800.247.8583 • Fax: 402.593.8107 • www.essvote.com

# APPENDIX I

# INSTRUMENTATION SHEETS

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 1/8/2014 JOB NUMBER: T71379.01 TYPE OF TEST ELECTRICAL SUPPLY

TECHNICIAN: A. STEWART CUSTOMER: ES&S TEST AREA: VSTL LAB

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | STOP WATCH | HANHART | STRATOS1 | 110132 | 110132 | 10HR | 5 sec/day | 9/11/2013 | 9/11/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 1/8/14 CHECKED & RECEIVED BY: 1/8/14

Q.A.: 1/8/14

WH-1029A,REV,APR'99

Page 1 of 1

wyle laboratories

# INSTRUMENTATION EQUIPMENT SHEET

DATE: 1/27/2014 JOB NUMBER: T71379.01 TYPE OF TEST USABILITY ACCESSIBILITY

TECHNICIAN: A STEWART CUSTOMER: ES&S TEST AREA: VSTL LAB

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | PUSH-PULL GAGE | CHATILLON | DPP-50 | NSN | 102211 | 50 LBS | ± 0.5% | 1/24/2014 | 7/24/2014 |
| 2 | STEEL RULER | STARRETT | 22551510 | N/A | 115571 | 900mm | ±0.1mm | 1/24/2014 | 1/24/2019 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 1/27/2014 CHECKED & RECEIVED BY: 1/27/14

Q.A.: 1/27/14

WH-1029A,REV,APR'99

Page 1 of 1

wyle laboratories

## INSTRUMENTATION EQUIPMENT SHEET

DATE: 1/29/2014 JOB NUMBER: T71379.01 TYPE OF TEST ACOUSTIC

TECHNICIAN: D. LEE CUSTOMER: ES&S TEST AREA: EMI CHAMBER 1

| No. | Description | Manufacturer | Model | Serial # | WYLE # | RANGE | ACCURACY | Cal Date | Cal Due |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SOUND LVL MTR | BRUEL & KJAER | 2236 | 2054711 | 114356 | 10 - 140dB | .5dB | 9/25/2013 | 9/25/2014 |
| 2 | TAPE MEASURER | LUFKIN | HV1048CME | NSN | 02708 | 8meters | 41mm | 4/24/2012 | 4/24/2014 |

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: Davinder 01/29/14 CHECKED & RECEIVED BY: Stephen 1/29/14

Q.A.: Michael Cooper 1/29/14

WH-1029A,REV,APR'99

Page 1 of 1

# APPENDIX J

# TESTING TO REFLECT ADDITIONAL CAPABILITIES

## 1.0 Introduction

The Voluntary Voting System Guidelines (VVSG) allows for vendors to provide additional system capabilities in order to respond to the requirements of individual states. The scope of testing for these additional capabilities is pre-defined prior to the start of the test campaign.

## 2.0 Scope of Testing

Testing was conducted on the following additional components of the EVS 5.2.0.0 Voting System:

- ExpressPass Application – A standalone application that interfaces with Voter Registration (electronic Pollbook) systems and the ExpressPass printer to print the ballot activation code on an ExpressVote activation card. This code on the activation card activates the correct ballot the voter is authorized to vote.

- ExpressPass Printer – A small, thermal, on demand printer used to print the ballot activation code on the ExpressVote activation card.

Table J2-1 lists the equipment used for the additional testing.

**Table J2-1**

| Equipment | Model Number | Manufacturer | Description | Serial Number |
|---|---|---|---|---|
| ExpressPass Printer | 4200 | Microcom | Thermal bar code printer | 01901042505 |

## 2.1 Source code review

The Source Code Review for the ExpressPass Application version 1.1.0.0 was conducted in accordance with all EAC 2005 VVSG requirements.

- Selection of programming languages
- Software integrity
- Software modularity and programming
- Control constructs
- Naming conventions
- Coding conventions
- Comment conventions

## 2.2 Technical Data Package Review

- ExpressPass Application Operator's Guide

## 2.3 Functionality Testing

- Installation and Uninstallation of the ExpressPass Application version 1.1.0.0.
- Proper activation of ballots using ExpressPass printed bar codes created on the ExpressVote cards generated in the Manual Mode of the ExpressPass Application version 1.1.0.0.

## 2.4 Trusted Build

A Trusted Build of the ExpressPass Application was created using ES&S's Trusted Build documentation. The build was conducted in accordance with all EAC 2005 VVSG requirements, and was performed according to the following steps:

- Clear hard drive of existing data
- Retrieve the compliant source code
- Retrieve the installation media for OS, compilers, and build software
- Construct the build environment
- Create digital signatures of the pre-source build environment
- Create a disk image of the pre-source build environment
- Load the compliant source code into the build environment
- Create a digital signature of the post-source build environment
- Create a disk image of the post-source build environment
- Build the executable code
- Create the installation media
- Create a digital signature of the final build environment
- Create a disk image of the final build environment
- Create a digital signature of the installation media
- Install executable code onto the hardware and validate the software/firmware
- Deliver source code with digital signature, disk image of pre-build environment with digital signatures, disk image of post-build environment with digital signatures, executable code with digital signatures, and installation media to the EAC Repository.

The "Trusted Builds" for the EVS 5.2.0.0 Voting System included source code, data, and script files in clear text form. Additionally, ES&S provided commercially available media and download links for the required COTS software. NTS verified all COTS software by generating and subsequently verifying hash values from each software supplier. Prior to performing each build, a commercially-available software tool was used to clear each sector of the disk drives of any existing data. Afterwards, the designated Operating System was loaded, and the application was built using the previously verified source code and COTS software. The final step in the process included verifying the ExpressPass Application by installing it onto the EMS hardware.

# 3.0 Testing Results

## 3.1 Source Code Review

- ExpressPass Application
    - All EAC 2005 VVSG requirements violations were resolved prior to the commencement of the Trusted Build process.
    - The Trusted Build process was successfully completed for ExpressPass Application version 1.1.0.0.

## 3.2 Technical Data Package Review

The following documents submitted were reviewed to the EAC 2005 VVSG requirements. The processes and procedures contained in the ExpressPass and ExpressVote documents were confirmed to successfully install, configure, and test the ExpressPass Application and the QR code scanner tethered to the ExpressVote. The procedures contained in the build document were followed to successfully build the ExpressPass application.

**Table J3-1**

| EVS 5.2.0.0 ExpressPass and ExpressVote TDP Documents | Version | Date | Document Number |
|---|---|---|---|
| System Overview | 9.0 | 04/11/2014 | 01-01 |
| ExpressPass Operators Guide | 4.0 | 03/20/2014 | 07-12 |
| Build Procedure, ExpressPass v 1.1.0.0 | 1.1 | 04/03/2014 | N/A |

## 3.3 Functionality Testing

NTS personnel successfully printed activation bar codes on 200 ExpressVote cards used during the ExpressVote Accuracy Test detailed in the section 4.5.5 of this Test Report. The ExpressPass Application and the ExpressPass Printer were used for this test. The ExpressVote successfully read all of activation bar codes on the cards. No issues were noted during the execution of this test.

# APPENDIX K

# EXPRESSVOTE SUMMATIVE USABILITY REPORT

**2014**
Clemson University and ES&S
04/07/2014

# ExpressVote Usability Report
## ES&S Voting System 5.2.0.0

Tamirat Abegaz | Edward Dillon, Ph.D. | Wanda Eugene, Ph.D. | Pascal Lola | Aqueasha M. Martin | Juan E. Gilbert, Ph.D.

Clemson University
Human-Centered Computing Lab

A usability test of ES&S ExpressVote Universal Voting System version 1.0 was conducted during February and March of 2014 at Clemson University. The purpose of this test was to fulfill requirements for EAC certification of the ES&S Voting System 5.2.0.0 based on the Voluntary Voting Systems Guidelines (VVSG Version 1.0).


DATE OF USABILITY TEST: 02/28/2014 – 03/10/2014
DATE OF REPORT: 04/07/2014
REPORT PREPARED BY: Clemson University, Human-Centered Computing Lab
Juan E. Gilbert, Ph.D.
864.656.4846
juan@clemson.edu
100 McAdams Hall, Clemson University, Clemson, SC 29634
REPORT PREPARED FOR: Election Systems & Software

## TABLE OF CONTENTS



# I. Executive Summary

The Human Centered Computing Lab (HCCL) conducted a usability test of the ExpressVote Universal Voting System version 1.0 during the months of February and March 2014 at Clemson University. The purpose of this test was to fulfill requirements for EAC Certification of the ES&S Voting System 5.2.0.0 (EVS 5200) in compliance with the 2005 Voluntary Voting System Guidelines (VVSG version 1.0).

During the usability test, 68 voters from the general population used the ExpressVote in a simulated election. The election consisted of 1 test ballot with 11 contests, including:

- Federal, state and local contests
- Partisan and nonpartisan contests

- Single member and multimember contests
- Retention contests
- Constitutional amendments
- Referenda and ballot initiatives

The test ballot developed by ES&S and approved by the HCCL was used to simulate the tasks that users will be asked to perform during the usability tests.
This ballot includes tasks that model typical ballots from around the country, including:

- Voting for names at various locations within a list of names
- Voting a partial slate in a multimember contest
- Skipping elements of a ballot
- Write-in votes

During the usability test, participants worked alone and were only provided assistance or help by the test administrators as requested. Following the conclusion of the testing, the results were analyzed to determine participants' effectiveness, efficiency and satisfaction using the ExpressVote.

Based on data collected and analyzed, the following summary results indicate that the ExpressVote usability is better than average, performs accurately, and is well received by voters:

- 100% of ballots were successfully submitted/completed
- 92.14% of the requested tasks were completed without any issues
- 118 assists were provided, the majority related to voter understanding of the task instructions
- 5.8 minutes was the average time to complete the voting session
- A Likert Scale rating of 3.9 out of 5 indicated confidence by voters that they had used the system correctly
- A System Usability Score (SUS) of 72.09 indicated that voter satisfaction with the system is above average
- The Holistic Usability Measure (HUM) further indicates that the ExpressVote provides above average usability for the majority of participant groups.

# II. Introduction

The primary purpose of this study was to examine the usability of the ExpressVote EVS5200 voting machine. The EVS5200 voting system includes a touch-screen display, an audio-tactile interface, and an integrated card reader and printer. The audio-tactile interface includes three assistive technologies-- two position switches and a keypad. The ExpressVote system was designed to accommodate voters in the general voting population, including voters with cognitive, dexterity, auditory, and visual impairments. For this study, participants in each of those populations tested either the visual/touchscreen or the audio-tactile modality and observational data were collected to compute effectiveness, efficiency, and voter satisfaction in the human-voting system interaction.

# III. Planning the Study

## Timeline

The study was conducted over a period of 5 months (See Figure 1). Five to six usability researchers met to discuss usability requirement material provided by ES&S, draft a study protocol and data collection forms, and complete required documents for Institutional Review Board (IRB) submission. After obtaining IRB approval, the research team spent about 3 months recruiting participants, conducting a pilot study, amending the original IRB documents, conducting the usability tests, collecting data, analyzing the data, and drafting the usability report.

**Figure 1. Study Timeline**

| | November | December | January | February | March |
|---|---|---|---|---|---|
| ExpressVote Training | | | | | |
| Study Design/Planning | | | | | |
| Institutional Review Board | | | | | |
| Recruitment | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Pilot | | | | | |
| Amendment to Original Study Design | | | | | |
| Conduct Testing | | | | | |
| Drafting Report | | | | | |

## Research Team

The research team consisted of 5 people (3 mid to senior level Ph.D. students and 2 postdoctoral researchers). The research team underwent a one-day training session provided by the machine vendors. The session included a presentation on the machine, a demonstration, and a hands-on training session. The training included instructions on voting, using the voting machine's accessories, and troubleshooting technical issues. In addition to the aforementioned training provided by the vendor, the research team conducted its own informal training on the machines' setup and use before the pilot study.

## Usability Protocol Design

The protocol was designed to allow the usability team to primarily collect quantitative data on participants' interactions with the system's visual/touchscreen and audio-tactile interaction modalities, their subjective ratings of satisfaction and confidence in using the system, and other qualitative observational data. The usability testing protocol was developed using guidance from information provided by the National Institute for Standards and Technology (NIST) and the vendor. The researchers met to develop the initial set of testing materials including a demographic survey, pre-testing survey, voting instructions, visual and audio voting tasks, and post-questionnaire. Observational coding sheets were also developed to aid in the collection of observational data during the study. All materials, in addition to an informed consent form and recruitment materials were submitted to the Clemson University Institutional Review Board (IRB) for approval.

While awaiting IRB approval, a review meeting was conducted with a larger team of Human-Computer Interaction researchers to identify any additional elements that could improve the study. From that meeting, several tasks were added to the audio and visual instructions task list. In addition to the review, a pilot was conducted with the larger

research team to refine the protocol and study materials. Nine participants from the researchers' lab participated in the pilot study. From this pilot, several changes were made to the data collection materials and updates were made to the protocol. The protocol and all study materials were then submitted to the IRB for an amendment to the previously approved application. Approval for the IRB amendment was obtained before beginning the study with participants.

# IV. Methods

## Recruitment and Participants

Recruitment was conducted by word-of-mouth or by email through local organizations in the local community. Seventy-one participants were recruited, however 3 participants were excluded due to incomplete or inconsistent data. Therefore, the final report includes data analysis for 68 participants. Approximately 48.5 % (n=33) of the participants were 30-64 years old, 79.4% (n=54) were Caucasian, and 66.2% (n=45) had a Graduate Degree (See Tables 1 - 3).

**Table 1. Participants' Age Ranges**

| Age | Number of Participants | Percent |
|---|---|---|
| Under 18 | 0 | 0.0% |
| 18 to 29 | 6 | 8.8% |
| 30 to 64 | 33 | 48.5% |
| 65 and older | 29 | 42.6% |

**Table 2. Participants' Races**

| Race | Number of Participants | Percent |
|---|---|---|
| African American | 12 | 17.6% |
| Caucasian | 54 | 79.4% |
| Hispanic | 0 | 0.0% |
| Asian | 1 | 1.5% |
| American Indian | 0 | 0.0% |

| | | |
|---|---|---|
| Others | 1 | 1.5% |

Table 3. Participants' Education Levels

| Education | Number of Participants | Percent |
|---|---|---|
| Did not Finish High School | 2 | 2.9% |
| High School | 0 | 0.0% |
| Some College | 9 | 13.2% |
| College Degree | 12 | 17.6% |
| Graduate Degree | 45 | 66.2% |

Participants were recruited from the general voting population; however, participants were purposefully recruited from the following groups: blind, low-vision, and dexterity. Five of the participants recruited identified as having vision impairments and 3 participants identified as having dexterity impairments. In addition, 5 participants identified as having cognitive impairments and 6 identified as having hearing impairments.

## Environment and Equipment

The usability tests were held in rooms suitable for a voting activity. Conference rooms at each of the three locations were rearranged to fit this purpose. Each conference room included a large table with chairs that were used to administer the pre and post-test. Research team members rearranged the furniture in the room to provide easy unobstructed access to the voting stations. Voting stations were arranged along the wall of each room to remove any screen glare from external or internal lights and to provide ease accessibility for persons with disabilities.

One or two ExpressVote EVS5200 voting machines were set up in the voting locations. One machine sat on a table and the other inside a voting booth stand--both supporting structures were provided by the manufacturers. The supporting structures were not variables observed in the study. The table was designed to accommodate voters in wheelchairs or similar ambulatory devices. The table was used in all three studies; the booth was only used in two. Since the voting machine that sat on the table was designed for those in wheelchairs, a chair was set up near the machine so that voters without a wheelchair could still use the same machine.

Each voting machine included assistive peripherals included by the manufacturer, including a keypad, a two-position switch, and a set of headphones. The keypad remained connected to the machine throughout the testing, however the headphones and two-position switch were only connected for those who requested/needed them.

## Experiment

Upon arrival each participant was greeted and provided with an informed consent form. The informed consent form explained the purpose of the study, risks, benefits, and that the study was voluntary and could be ended at any time. If the participant agreed to continue, he/she was provided with a demographic questionnaire. The demographic questionnaire included questions about the participant's personal characteristics (e.g. age, gender, race), disabilities, and familiarity with voting technologies (See Appendix – Pre-Questionnaire). After completing the demographic survey, the participant was then escorted to the voting machines. The participant was then provided with voting instructions and a set of audio or visual voting tasks, depending on what voting modality the participant requested. The participant was provided with time to read the voting instructions and voting tasks and ask questions. In the case where the participant was blind, instructions were read to him/her. Low-vision participants had a choice of reading the instructions alone or having someone read them. An observer then provided additional instructions and reminded the participants to follow the instructions on the voting tasks list in the order they appeared. In the case of blind participants, tasks from the audio task list were read to the participant by one of the observers. An observer then provided the participant with a ballot card and asked the participant to begin when ready.

During the testing, two researchers acting as observers timed the participant's interactions with the voting machine. Timing began when the participant entered his or her ballot card and ended once the participant printed the card or cancelled the voting session. The observers also noted any assists (task, technical, or instructional) given to the participant during the testing session and any error that were made (See Appendix – Observational Coding Sheet). Errors were marked when participant selections did not match instructions provided on the voting instruction list. At the end of the testing session, the participant was led to another researcher to complete a post-test questionnaire. The two observers compared observation notes and prepared for the next participant.

At the end of the testing session, the participant was asked to complete a post-test that collected data on their experiences and satisfaction with the voting machine (See Appendix – Post-Test). The questionnaire included 16 statements. For each statement, the participant

was asked to rate their agreement with a 5-point Likert scale (1 strongly-disagree to 5 strongly-agree) rating. Afterward, the participant was thanked and provided with a $50 gift card for their participation in the study.

## V. Usability Test Results

The voting machine was evaluated for effectiveness, efficiency, and voter satisfaction. A total of 1 participant chose to use the audio interface and 67 used the visual interface. Self-reported participant data and observational data from the usability team was collected and analyzed. After the study, observational data collected by each of the two observers was compared for validity and discrepancy removal. In addition, descriptive statistics (e.g. averages, frequency) were performed on quantitative data.

### Effectiveness

Four metrics were used to measure effectiveness including a task completion score, the percentage of tasks completed without errors, the number of assists provided, and a perfect ballot index.

#### Number of Ballots Cast Successfully

All participants were able to cast their ballots successfully. A ballot was considered successfully cast when the voter completed the voting task and cast their voting card. In the case of this study, a successfully cast ballot was one that was printed. The voter completion rate was 68/68 or 100%. The voter completion rate is the percentage of test participants who were able to complete the voting and balloting casting tasks.

#### Perfect Ballot Index & Percent of Tasks Completed

The perfect ballot index is the ratio of the number of cast ballots containing no erroneous votes to the number of cast ballots containing one or more erroneous votes. Erroneous votes included voting for the wrong candidate or voting for the wrong number of candidates. The perfect Ballot Index for this study was 37:31. Thirty-seven ballots were cast with no erroneous votes and 31 of the ballots cast contained one or more erroneous votes.

Observation data revealed that participants voted erroneously a total of 75 times (See Table 4). Twelve participants had trouble inserting the voting card correctly. When tasked to verify their voting selections and make a change to the ballot from the verification screen, twenty-seven participants failed to do so or had trouble

completing this task. Seven participants did not write-in a candidate when instructed to do so and twenty-four participants voted for an additional candidate when instructed to vote for only two candidates. Finally, five participants were unable to print their voting card without assistance. The five that needed assistance attempted to print the voting card by selecting the icon on the ExpressVote instruction panel (See Figure 1). In total, 68 participants completed 954 tasks. Therefore, 92.14% of the tasks were completed correctly. Our summary observation is that in general the vast majority of erroneous task voting was attributable to voter confusion or misunderstanding of the voting instructions provided and was not a result of usability issues on the ExpressVote.

**Table 4.Task Deviations**

| Type | Number |
|---|---|
| Inserted card incorrectly | 12 |
| Did not follow instructions correctly to verify their voting selection and make changes to ballot | 27 |
| Did not complete write-in task as instructed | 7 |
| Voted for the wrong number of candidates as specified in the voting instructions | 24 |
| Selected print icon on instruction panel (See Figure 1) | 5 |

**Figure 1. ExpressVote Instruction Panel**


11

### Number of Assists Provided

A total of 118 assists were provided to participants during the voting task (See Table 5). Three types of assists were recorded: instructional, task, and technical. Instructional assists were provided for clarification on the test or task instructions. Task assists were provided to help voters complete a task on the voting task list. Technical assists were provided to help voters recover from a system error or bug. Table 6 provides the average technical, instructional, and task assist per participant in each respective group.

## Efficiency

Efficiency was measured as the average voting session time or mean time taken per voter to complete the process of activating, filling out, and casting the ballot. The average session time was 5.8 minutes amongst all participants. For each group, Table 7 provides the average voting session times.

**Table 5. Count of Assists Provided**

| Type of Assist | Number |
|---|---|
| Instructional Assists | 83 |
| Task Assists | 35 |
| Technical Assists | 0 |

**Table 6. Average Assist per Participant Group**

| | Technical Assist | Instructional Assist | Task Assist |
|---|---|---|---|
| Blind/Low Vision | 0 | 6.2 | 1 |
| Deaf/Hearing | 0 | 0.17 | 0.16 |
| Dexterity/ Motoric | 0 | 1.33 | 1.33 |
| Cognitive | 0 | 0.6 | 0 |
| General | 0 | 0.71 | 0.27 |

Table 7. Average time to complete the voting session in minutes

| Voter Type | Average session time |
|---|---|
| Blind/Low Vision | 9 |
| Deaf/Hearing | 4.82 |
| Dexterity/ Motoric | 6.34 |
| Cognitive | 7.97 |
| General | 5.11 |

## Voter Satisfaction

The System Usability Scale (SUS) was used to measure voter satisfaction. The system usability scale is a well-known and validated metric for evaluating the usability of a system. SUS includes 10 questions, five of those questions are positive and five are negative. The participant rated each question on a scale of 1-5 (Strongly Disagree - Strongly Agree). A SUS score is calculated and the score can be interpreted using a grading scale of A-F where A is perfect usability and F is terrible usability. The average SUS score ranges between >=60 and <=69. The SUS average score amongst all participants for ExpressVote was **72.09**. Table 7 provides the mean SUS score for each categorized group of participants.

## Voter Confidence

As part of the Post Questionnaire, a question regarding voter confidence was included. The participants provided their level of confidence for using ExpressVote based on a 5-point Likert Scale (*1=Strongly Disagree* AND *5=Strongly Agree*). Table 8 provides the mean score from the Likert Scale for each categorized group of participants.

Table 8: Voter Satisfaction Ratings

| Voter Type | Mean SUS Score |
|---|---|
| Blind/Low Vision | 68.50 |
| Deaf/Hearing | 70.42 |
| Dexterity/Motoric | 65.00 |
| Cognitive | 62.50 |
| General | 73.88 |

13

Table 9. Voter Confidence - Mean Score (using a 5-point Likert Scale)

| Voter Type | Mean Score |
|---|---|
| Blind/Low Vision | 3.4 |
| Deaf/Hearing | 4.0 |
| Dexterity/Motoric | 3.3 |
| Cognitive | 3.2 |
| General | 3.8 |

## HUM

The Holistic Usability Measure (HUM) evaluates the usability of a system based on different metrics that are defined by the designer. For this study, 9 metrics were used and the usability team assigned weights to each metric according to their understanding of the importance of each metric in the voting process (See Table 10). For example, since the goal of an election is for a voter to successfully cast a ballot, completion rate was given a higher weight followed by ballot error rate and efficiency. In other words, this particular assignment of weight values prioritizes successful ballot casting, error-free ballot completion, and efficient ballot marking by assigning higher HUM weight values to completion rate, ballot error rate, and efficiency or completion time. All other metrics (e.g. satisfaction, confidence, assists, etc.) were given an equal distribution of weight values in the HUM calculation.

Table 10: HUM Scores and Weights

| Metric | Weight | Blind/Low Vision | Deaf/Hearing | Dexterity/ Motoric | Cognitive | General |
|---|---|---|---|---|---|---|
| SUS Satisfaction | 0.04 | 0.75 | 1 | 0.75 | 0.75 | 1 |
| SUS Confidence | 0.04 | 0.75 | 1 | 0.75 | 0.75 | 1 |
| Efficiency | 0.21 | 0 | 0.5 | 0.25 | 0.25 | 0.5 |
| Effectiveness (Completion Rate) | 0.3 | 1 | 1 | 1 | 1 | 1 |
| Effectiveness (Ballot Error Rate) | 0.25 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| Effectiveness (Task Error Rate) | 0.04 | 0.75 | 0.75 | 0.5 | 0.75 | 1 |
| Effectiveness (Task Assists) | 0.04 | 0.75 | 1 | 0.75 | 1 | 1 |
| Effectiveness (Instructional Assists) | 0.04 | 1 | 1 | 1 | 1 | 1 |
| Effectiveness (Technical Assists) | 0.04 | 1 | 1 | 1 | 1 | 1 |
| HUM score | | 0.6875 | 0.8225 | 0.73 | 0.75 | 0.8325 |

The HUM metrics for the different groups of participants show that ExpressVote was more usable among the General Population (83.25%) followed by the Deaf/Hearing (82.25%) and Cognitive (75%). The HUM score is calculated as follows:

**HUM = W1*Metric1 + W2*Metric2 + ... + Wn*Metric n**
**where W1 + W2 + ... + Wn = 1**
**and 0 ≤ W1, W2, ..., Wn ≤ 1**

For this study, the HUM score was calculated by multiplying each metric with the weight defined by the usability team. For example, for the Blind/Low Vision HUM was calculated as follows: HUM = 0.3(1) + 0.25(0.75)+...+0.4(1).

## Observational Notes

In addition to the above metrics, observers also collected notes during the study pertaining to issues participants encountered with the system. These notes are provided below:

- When asked to print the ballot (see Figure 1), five participants attempted to select the print icon provided to the right of the panel (the voting instruction panel) of the ExpressVote machine.

- Some participants had trouble inserting the card into the machine. This was particularly a challenge for the voters with visual or dexterity impairments.
- Participants were most confused with what to do when alerted that they had not fully voted one of the contests. Participants were most confused with the voter instruction advisory such as the undervote alert. For example, they were confused with what to do when alerted that they had not fully voted one of the contests and this may have increased the number of erroneous votes and the amount of time taken to vote.

## VI. Discussion

It is important to note that based on observations of the usability team, two factors may have played a role in some of the outcomes outlined in the results section. On both the audio and visual task lists, the first task was placed out of order on purpose as to evaluate whether or not a person wishing to only vote for a certain candidate could easily navigate through the ballot interface. Despite being asked to vote based on the order and instructions that appeared on the task list, nearly every participant skipped this step. In addition, because the task was not in order as the other tasks in the list, it was observed that some participants did not pay close attention to the instructions and therefore voted for the wrong candidate for the rest of the study.

Second, one task was included to evaluate the voter instruction advisory provided by ExpressVote. It was observed that oftentimes, because the instructions on the ballot (vote for 3 candidates) were not consistent with the instructions on the task list (vote for 2 candidates), participants would either ask for clarification resulting in an instructional assist or simply vote for 3 candidates which resulted in a deviation from the task.

In addition, for the Blind/Low Vision and Cognitive participant groups, researchers read the voting task list to the participants. This may have increased the number of instructional assists for these groups. Similarly, because the tasks were read to the participants, it may have also impacted the number of task deviations and the overall task completion time.

Our conclusion is that the voting assists and task deviations identified above may have been related to voters not understanding and correctly following the written test instructions.

## Summary

Overall, all participants (n = 68) were able to cast their ballot successfully. Approximately, 92.14% of the voting tasks were completed without error. Of the 118 assists provided, 83 (67.47%) were instructional or to clarify instructions provided on the voting task list. On average, Blind/Low Vision voters received the most instructional assists (mean = 6.2). Thirty-seven ballots were cast with no errors and 31 of the ballots cast contained one or more errors. The highest average session time was among the Blind/Low-Vision group (mean = 9) and lowest among the Deaf/Hearing (mean = 4.82). The system usability score for the ExpressVote system was 72.09 which indicates a higher than average level of user satisfaction among participants. The lowest mean SUS score (mean = 62.50) was among the Cognitive participants. Most voters were neutral or confident they could use the system in a real election. Finally, the HUM metrics for the different groups of participants show that that ExpressVote was more usable among the General Population (83.25%) followed by the Deaf/Hearing (82.25%) and Cognitive (75%). Overall, these results suggest that the ExpressVote is a usable and accessible voting technology.

# VII. Appendix

## Informed Consent Form

RESEARCH DESCRIPTION for Usability Benchmarks for Voting Systems

PRINCIPAL INVESTIGATOR: Dr. Sharon Laskowski, 301-975-4535

The National Institute of Standards and Technology (NIST) is developing guidelines for the usability of voting systems under the directives in the Help America Vote Act (HAVA). This study is being performed to determine how easy or difficult it is for voters to use voting machines. Usability will be measured by determining the time it takes a voter to vote, the number of errors when the vote is cast, and voter satisfaction. The results of this study will be used to develop usability test methods and benchmarks for voting machines. The research is funded by the Election Assistance Commission (EAC) and NIST and conducted by User-Centered Design, Inc. and NIST.

We collected your demographic data at the time your appointment was set up. This includes age, gender, education level, race, location, reading ability, experiences related to voting, and any disabilities. We will use this data in our analysis. For this study, you will be given written or audio instructions on how you as a voter "want to vote" in a mock election. You will be asked to vote as instructed on a specific voting machine. In addition to collecting your votes, there may be a camera focused on the machine and your hands, but your face will not be photographed. After you cast your ballot, you will be asked for your opinion about the voting machine. This process should take you no more than 30-60 minutes.

CONFIDENTIALITY: All of your voting time and error data, demographic data, and voter experience and satisfaction/confidence data will be recorded without identifiers. When you were recruited, we were given your name and demographic data. If you agree to participate in this study, we will assign you a number. Your data will only be identified and linked together by a number, and will not be linked back to your name or other identifier in any way. We will not use your name in any of the data or the reporting. The original list containing your name will be destroyed after the testing is completed.
Your identity will be protected to the extent permitted by law, including the Freedom of Information Act. Members of the NIST Institutional Review Board (IRB), appropriate NIST researchers and contractors, EAC members and staff, and other appropriate Federal employees may review the records of this study. The data will be used by NIST researchers to create usability performance benchmarks and test methods for voting machines.

You are free to withdraw from the study at any time during the experiment. In total, we expect to have approximately 1000 subjects complete the experiment.

[Continue on other side]

There are no risks involved in participating in this study, nor are there any immediate benefits to you as a subject. The long-term benefits of this study should be improved voting systems.
***COMPENSATION: You will be paid $50 in cash for your participation in this study before you leave.***

CONTACT INFORMATION: For questions regarding this study, please contact Dr. Sharon Laskowski at (301) 975-4535, sharon.laskowski@nist.gov. For questions regarding your rights as a human subject, please contact Lisa Karam, Acting NIST IRB Chairperson, at (301) 975-5561 or (301) 975-3190 or lisa.karam@nist.gov.

"I have read the above description of this research project. I have also spoken to the project researcher, who answered any questions I had about this project. I acknowledge that I have received a personal copy of this form. I agree to participate in this research and I understand that I may withdraw at any time."

Signature: _____ Date: _____

Project researcher name: _____

Project researcher signature: _____ Date: _____

19

## Observational Coding Sheet

Participant # _____ Video ____ Audio ____ (Check one)

Session Start Time _____ Session End Time _____

| Task # | Error(s) | No Assist | Instructional Assist | Task Assist | Technical Assist |
|---|---|---|---|---|---|
| Task 1 | | | | | |
| Task 2 | | | | | |
| Task 3 | | | | | |
| Task 4 | | | | | |
| Task 5 | | | | | |
| Task 6 | | | | | |
| Task 7 | | | | | |
| Task 8 | | | | | |
| Task 9 | | | | | |
| Task 10 | | | | | |
| Task 11 | | | | | |
| Task 12 | | | | | |
| Task 13 | | | | | |

**Voting Successfully Completed**
Was the voter able to complete the process of voting and casting their ballot (i.e. print ballot)?
Yes No

**Notes:**
**What is an Error?**
Was the voter able to complete each task without error?

- Example(s) of an Error
  - The voter selected the wrong candidate.
  - The voter was unable to write-in a candidate.

**What is an Assist?**
How many times did the voter request or require assistance from a research team member? What type of assistance was requested?

- Technical Assist – help voter recover from a system error or bug
- Instructional Assist – provide clarification on the test or task instructions
- Task Assist – help voter complete a task

20

**Voter Instructions**

In our mock election, we will be using fictitious names for candidates. Colors will designate the political parties. Any similarity between names of candidates and real people is purely coincidental. For example, you might see or hear this:

GEORGE BENDER / PURPLE

Or

DIANNE HILSWORTH / SILVER

Please attempt to vote as described and follow the instructions that are available. There are written and audio voting instructions available on the ExpressVote that will help you understand how to vote. You will move through the ballot from contest to contest until you get to the end. There will then be a summary of your selections so you can verify your choices. When you are satisfied that you have voted correctly, you may print the card with your vote selections and cast your votes. If you don't wish to cast your votes, then you may choose to have the card returned to you.

Once you start, the assistance we can give you is limited.

Please do the best you can. If you are stuck and cannot continue, inform one of your researchers.

Now, follow the instructions to begin voting.

Thank you.

21

**Visual Voting Instructions**

Please vote exactly as described on this page.

1. ***Insert the card to activate the ballot and begin voting***

2. Vote for STATE SENATOR DISTRICT 36
3. For PRESIDENT/ VICE-PRESIDENT, vote for candidate:
   **GEORGE BENDER**
4. For GOVERNOR, vote for a Write-In candidate by entering:
   **BOB SIMMS**
5. For UNITED STATES SENATOR, vote for candidate:
   **DIANNE HILLSWORTH**
6. Vote for a candidate for UNITED STATES REPRESENTATIVE DISTRICT 19
7. Vote for a candidate for the MEMBER OF STATE ASSEMBLY DISTRICT 66
8. Vote for two candidates for City Council- Lemon Grove
9. Vote for Retention of Judges – Moreno - **YES**
10. Vote for Retention of Judges – Baxter - **YES**
11. For CONSTITUIONAL AMENDMENT D:
    **DO NOT VOTE**
12. For BALLOT MEASURE 106, vote for:
    **NO**
13. On the Summary Page, Change Vote for Retention of Judges – Moreno to **NO**

**14. Verify your selections from the summary page**

**Print your card**

22

## Audio Voting Instructions

Please vote based on my instructions.

***1. To begin, put on the headphones and follow the instructions to insert the card.***

2. Adjust the Speed or Volume of the audio

3. Vote for STATE SENATOR DISTRICT 36

4. For PRESIDENT/ VICE-PRESIDENT, vote for candidate:
   **GEORGE BENDER**

5. For GOVERNOR, vote for a Write-In candidate by entering:
   **BOB SIMMS**

6. For UNITED STATES SENATOR, vote for candidate:
   **DIANNE HILLSWORTH**

7. Vote for a candidate for UNITED STATES REPRESENTATIVE DISTRICT 49

8. Vote for a candidate for the MEMBER OF STATE ASSEMBLY DISTRICT 66

9. Vote for two candidates for City Council- Lemon Grove

10. Vote for Retention of Judges – Moreno - **YES**

11. Vote for Retention of Judges – Baxter - **YES**

12. For CONSTITUIONAL AMENDMENT D:
    **DO NOT VOTE**

13. For BALLOT MEASURE 106, vote for:
    **NO**

14. On the Summary Page, Change Vote for Retention of Judges – Moreno to **NO**

**15. Verify your selections from the summary page**

**Print your card**

23

## Pre-Questionnaire

1. Are you a United States citizen?
   - Yes
   - No

2. Have you ever participated in a usability test of a voting system before?
   - Yes
   - No

3. What is your education?
   - Did not finish High School
   - High School
   - Some College
   - College Degree
   - Graduate Degree

4. What is your Race or Ethnicity?
   - African American
   - Caucasian
   - Hispanic
   - Asian
   - American Indian

5. Do you consider yourself fluent in the English language?
   - Yes
   - No

   Are you eligible to vote in the United States?
   - Yes
   - No

6. Do you or anyone in your household or immediate family work in any of the following situations:
   - Information technology or software development
   - Usability or market research
   - Poll worker
   - Work for or have a financial interest in a voting machine manufacturing, development, marketing, evaluation or sales business or organization
   - Any other position that is part of the voting process

7. What is your gender?
   - Male
   - Female

8. How old are you?
   - Under 18
   - 18 to 29 years
   - 30 to 64 years
   - 65 years or older

9. Is English your primary language (the one you speak most regularly)?
   - Yes
   - No

10. Do you have a cognitive, language, or learning disability?
- Yes
- No

11. Are you deaf or do you have serious difficulty hearing?
- Yes
- No

12. Which of the following best describes your vision?
- I have normal or corrected to normal vision. "Corrected to normal" means that if you wear glasses or contacts, they allow you to read newspapers, magazines, or books without trouble
- I have no vision at all; I cannot see light
- I can only see light and dark, and cannot read or see details under any circumstances
- I can only read large-print, high contrast text (I cannot read normal-sized text, even when wearing glasses or contacts, unless it is held very close to my face)

13. Do you have serious difficulty concentrating, remembering or making decisions?
- Yes
- No

14. Do you have problems with any of the following:
- Following instructions with multiple steps
- Understanding what you read or hear
- Identifying the main idea
- Reading or gathering information from tables or charts

15. When reading, do you often:
- Reverse letters, numbers, words, or phrases
- Confuse similar words
- See letters/numbers out of order
- Add, skip, or omit letters
- Not applicable

16. Which of the following best describes your use of your hands or arms?
- I have full strength and use of my hands and arms
- I have no use of my hands and arms
- I have limited strength and use of my hands and arms

*(We're referring to the arm/hand that you primarily use, or would use when voting on an electronic system. Minor hand tremors are considered "full strength" unless accompanied by additional weakness or issues. Major uncontrolled tremors are included under "limited strength and use.")*

17. Can you reach your arms straight out in front of you and keep them there for at least 10 seconds without any pain?
- Yes
- No

18. Can you perform delicate tasks with your hands (such as writing the alphabet with a pen) for extended periods of time without pain?
- Yes
- No

25

[If you need clarification, see note under #12]

19. Do you have any other significant physical or mental disabilities or conditions that may prevent you from using an electronic voting system?
- Yes
- No

20. Do you regularly use any of the following?
- Non-motorized wheelchair
- Motorized wheelchair
- Walker or cane
- Motorized scooter

21. What types of voting systems have you used in the past?
- None
- Mechanical lever (voter sets switches and pulls a lever)
- Punch Card (voter punches holes in a card)
- Touch Screen (voter touches a screen to record a vote)
- Optical Scan (voter fills in an oval or arrow on paper and the vote is checked by a machine)
- Paper and pencil (voter fills in an oval or arrow on paper and the vote is checked by a human)
- Internet (voter makes selection online and cast the ballots)
- Telephone (voter uses a phone to make selection and cast the ballot)

22. Which of the following items do you regularly use?
- ATM Machines
- Computer
- Device to record from TV (DVD, VHS, etc)
- Digital Camera
- Cell Phone
- Self-checkout at store

23. Do you rely on audio (that is, sound) to use computers or ATMs?
- Yes, I use audio in addition to reading the screen
- Yes, I only use audio and don't look at the screen
- No, I don't use audio at all
- Don't use computers or ATMs often

24. Do any disabilities interfere with your voting independently?
- Yes
- No
- N/A

25. Which of the following devices do you use often and without difficulties?
- Pen and paper
- Keyboard
- Computer mouse
- Computer trackball
- Touch-screen
- Keypad
- Mini-keyboard
- Joystick
- Light-pen
- Rotary input knob
- Speech recognition system

Jelly switches
Screen reader
Other (please describe)

27

Post Test Questionnaire

**Please complete the following questions:**

**1. To the best of my ability, I followed the instructions that told me the names of individuals to vote for and how to vote on the issues**

__ Yes
__ No

**2.**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I felt comfortable using the voting system. | | | | | |

**3.**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I would like to use this voting system in a real election. | | | | | |

**4.**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I found the voting system difficult to use | | | | | |

**5.**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I would need the support of a poll worker to be able to use this system | | | | | |

**6.**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |

28

| | | | | | |
|---|---|---|---|---|---|
| The instructions for interacting with this voting system (how to use the machine, not for who to vote for) were easy to understand. | | | | | |

7.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I would imagine that most people would learn to use this voting system very quickly | | | | | |

8.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I felt very confident using the system | | | | | |

9.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I needed to learn a lot of things before I could get going with this system | | | | | |

--

10.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| The ballot text was easy to read or hear. | | | | | |

11.

| | Strongly | Disagree | Neutral | Agree | Strongly |
|---|---|---|---|---|---|

| | Disagree | | | | Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I was able to use the voting system without major problems. | | | | | |

12.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Writing-in a candidate was easy. | | | | | |

13.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| This voting system was easy to use. | | | | | |

14.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| The buttons on the touch screen were easy to use. | | | | | |

15.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| It was hard to move around the ballot with this system. | | | | | |

16.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Correcting my mistakes | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| was easy. | | | | | |

31