OFFER AND ACCEPTANCE FORM

TO PINAL COUNTY:

The undersigned hereby offers and agrees to furnish the material, service, or construction in compliance with all terms, conditions, specifications, and amendments in the Solicitation.

	Vice President of Finance
Authorized Signature	**Title**
Richard J. Jablonski	April 9, 2014
Printed Name	**Date**
Election Systems & Software, LLC	(402) 970-1103
Company Name	**Telephone**
11208 John Galt Blvd.	Omaha, NE 68137
Address	**City, State, Zip**

For clarification of this offer, contact:

Name: Seirra Seeley **Phone:** (480) 606-2300 **Fax:** (402) 970-1291

Email: seirra.seeley@essvote.com

ACCEPTANCE OF OFFER
(For Pinal County Use Only)

The offer is hereby accepted and the Responder is now bound to sell or provide the materials, services, or construction as indicated by the Purchase Order or Notice of Award and based upon the solicitation, including all terms, conditions, specifications, amendments, etc. and the Offer as accepted by Pinal County.

The contract is for:

This contract shall henceforth be referenced to as Contract No. **PC-131219**. The Responder is cautioned not to commence any billable work or to provide any material or service under this contract until Responder receives an executed purchase order or notice to proceed.

Awarded this 30th day of April 2014.

Anthony Smith	Chairman	
Name (Print)	Title	Signature

Approved as to form:

Pinal County Attorney's Office

OFFER AND ACCEPTANCE FORM – Page 2

By signing the previous page of the Offer and Acceptance Form, Responder certifies:

A. The submission of the bid did not involve collusion or other anti-competitive practices.
B. The Responder shall not discriminate against any employee or applicant for employment in violation of Federal Executive Order 11246.
C. The Responder has not given, offered to give, nor intends to give at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a public servant in connection with the Submittal.
D. The Responder certifies that it complies with Executive Order 12549 related to Federal Government Debarment and Suspension (see 4-7)
E. The Responder certifies that the individual signing the bid is an authorized agent for the Responder and has the authority to bind them to the contract.

Election Systems & Software, LLC
Firm

Authorized Signature

Enhancing the Pinal County Election Process

Request for Proposal for Elections Equipment and Maintenance
RFP# PC-131219
April 11, 2014

ORIGINAL

ELECTION
Systems & Software

PINAL • COUNTY
Wide open opportunity

Enhancing the Pinal County Election Process

RFP #PC-131219 – Elections Equipment and Maintenance

April 11, 2014

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

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Enhancing the Pinal County Election Process

RFP #PC-131219 – Elections Equipment and Maintenance

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Cover Letter

ELECTION Systems & Software

maintaining voter confidence. enhancing the voting experience.

April 11, 2014

Pinal County Finance Department
31 North Pinal Street
Building A
Florence, AZ 85132

Attention: Lorina Gillette, CPPB

RE: RFP for Elections Equipment and Maintenance (#PC-131219)

Dear Ms. Gillette:

Election Systems & Software, LLC ("ES&S") and its preceding companies has been privileged to provide election hardware, software, support, and services to Pinal County and jurisdictions across the State of Arizona since 1986.

As the leading voting system vendor in the United States, we are pleased to respond to Pinal County's Request for Proposal to replace the existing AccuVote-OS voting system with our state-of-the-art 2005 VVSG-compliant voting technology solution comprised of the DS850® central count high-speed vote scanner and tabulator, ElectionWare® election management software, and ES&S' stellar customer support and services.

KEY ASPECTS OF OUR SOLUTION FOR PINAL COUNTY

ES&S is providing Pinal County our election-proven voting system that has been used in binding elections throughout the United States. The centerpiece of our solution is our vote tabulation system, the **DS850 central count vote scanner and tabulator**, to process your mail and Vote Center ballots. The DS850 is unrivaled in speed, accuracy, and its ability to process folded ballots. Our digital-imaging solution allows for smooth, continuous ballot scanning from start to finish, which would save valuable time in the Pinal County election process.

Complementing the DS850 is our ADA-compliant ballot-marking device, the **ES&S AutoMARK®**. Designed with the assistance of several disability groups, more than 42,000 AutoMARK devices allow the disabled community to vote independently and privately using the same ballot as any other voter in the precinct. Our latest firmware release has improved the AutoMARK's reliability, usability, and security, among other new features.

Our **ElectionWare election management software** will allow Pinal County to create the election, lay out the ballot, program the voting system configurations and media, and view the stored cast-vote records and ballot images. This will enable the County with write-in resolution and voter intent adjudication.

THE FUTURE OF VOTING IN PINAL COUNTY

In our proposal, ES&S experts have developed a plan to migrate Pinal County's election system to leading-edge election technology. In addition to this product solution described above (collectively known as **EVS5000**), ES&S is proposing that Pinal County eventually take advantage of the future

version of the ES&S voting system (**EVS5200**), which is expected to be certified by the U.S. Election Assistance Commission (EAC) in June or July of 2014.

This migration plan would allow Pinal County to upgrade to the **ES&S ExpressVote® Universal Voting System**, which is a leading-edge technology touch-screen device that would enable voters to vote any ballot in the jurisdiction without the need for paper ballots. The ExpressVote fulfills federal accessibility requirements and allows all voters, with or without disabilities, to mark their ballots independently.

Our proposal provides Pinal County with ES&S' tried-and-tested solution of services and support for the term of contract, which includes the following:

- Implementation services that provide for planning and analysis, design and development, deployment and support of equipment and software, acceptance testing, and training on the new hardware and software.
- Hardware and software maintenance and licensing agreements throughout the term of contract.
- Pre-election, Election Day, and post-election support. Our support team of knowledgeable professionals is ready to assist you around the clock.

ES&S: THE ELECTION LEADER

ES&S is the recognized leader in the election market. Through the continual development and introduction of innovative election products, ES&S has emerged as the leading provider of end-to-end, fully integrated voting and business service solutions. With more than 60 percent of U.S. registered voters casting their vote on ES&S equipment, you can understand why more jurisdictions have chosen to lease or purchase their voting equipment, software, and election services products from ES&S.

Thank you for considering our proposal. We appreciate the opportunity to present our election-proven voting system to you and look forward to a continued partnership with you and your staff.

If you have any questions, please feel free to call me at my direct line (402) 970-1103.

You can also call Bryan Hoffman, our Vice President of Corporate Sales at (320) 267-4631, or your Arizona Regional Sales Manager, Seirra Seeley, at (480) 606-2300 and *seirra.seeley@essvote.com.*

We stand ready to move Pinal County to the next level of voting.

Very respectfully,

Richard J. Jablonski
Vice President of Finance

Election Systems & Software, LLC
11208 John Galt Boulevard · Omaha, NE 68137 · P: 402.593.0101 · TF: 1.800.247.8683 · F: 402.593.8107 · www.essvote.com

Executive Summary

PINAL•COUNTY
Wide open opportunity

Election Systems & Software, LLC ("ES&S") is pleased to present to Pinal County this proposal for the purchase, lease, or lease with an option to purchase a vote tabulation system, including hardware, software, and support services, to enhance the existing ES&S voting system and replace the AccuVote equipment used by Pinal County.

Since 1986, ES&S has been privileged to provide election hardware, support, and services to jurisdictions throughout the State of Arizona and in Pinal County. We have helped Arizona jurisdictions achieve success by providing reliable products and services to Arizona counties.

To accomplish your objectives, you need a partner who has driven this road before, someone like ES&S whom you know and trust. *You need an election industry leader with a proven Arizona track record of large-scale voting system implementations and decades of election experience in Arizona and throughout the United States.*

Your transition to our leading-edge election technology will improve all aspects of your election process for your voters, election staff, poll workers, and voting equipment technicians. ES&S' 28+ years of experience serving Arizona counties coupled with our vast election and project management experience will guide you smoothly through this transition. We look forward to working with you to implement the most technically advanced election solution in Arizona.

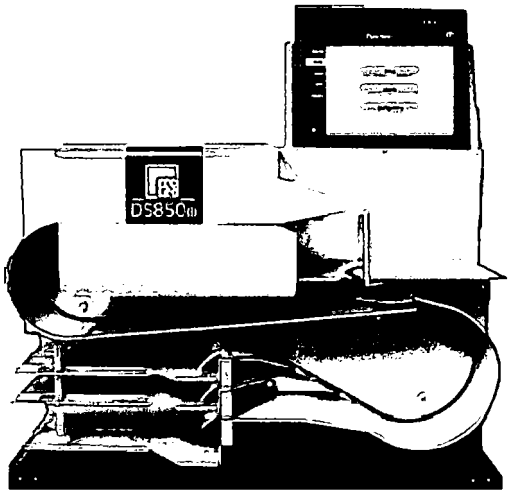
Pinal County Voting System Needs
We understand your needs to purchase the following hardware and software as well as the accompanying training, maintenance, and election support. ES&S is proposing that your needs can be met by this ES&S product solution:

- ✓ Two (2) **DS850® central count vote scanner and tabulators** deployed in Pinal County's regional counting center
- ✓ **ElectionWare®,** our integrated **Election Management Software (EMS)** solution
- ✓ Forty (40) ADA-compliant **ES&S AutoMARK®** ballot-marking voter assistance terminals that provide autonomy to voters who are sight disabled or have a disability or condition that makes it difficult to mark a traditional paper ballot
- ✓ Hardware and software maintenance agreements and election support services

Our Solution
DS850 - ES&S has reviewed your requirements in your Request for Proposal, and our experts have determined the best solution to meet the needs of Pinal County. The DS850 vote scanner and tabulator is the election marketplace's only high-speed tabulator specifically built for central count tabulation. No other vendor has built a scan and tabulator specifically for this purpose.

The DS850 is a proven solution, with more than thirty DS850 central count tabulators in use in North America. The combination of a system designed exclusively to correctly tabulate ballots and a system with a proven track record in real-life elections will provide the best solution for Pinal County.

With the increase of mail ballots and other absentee ballot voting throughout the United States, a high-speed central counter has becoming a crucial element in voting system solutions.



Key DS850 Features

✓ **High-Speed Sorting.** The DS850 can scan more than 300 14-inch double-sided ballots each minute – even folded ballots with full sorting options enabled. The DS850's three unique output bins allow programmable ballot sorting without compromising ballot-processing speed.

✓ **Folded Ballot Processing.** The DS850 was designed with a series of patent-pending TruGrip™ composite rollers that apply constant control to folded ballots throughout the entire process.

✓ **User-Friendly Design and Operation.** The DS850 features a user-friendly software interface on an easy-to-use 15-inch liquid-crystal display (LCD) color touch screen.

✓ **Patented Intelligent Mark Recognition™ (IMR).** The DS850's world-class image capture-and-processing capability has been integrated with Intelligent Mark Recognition to deliver fast, accurate election results. IMR is the latest in scanning technology that ensures a voter's marked ballot is read with utmost accuracy.

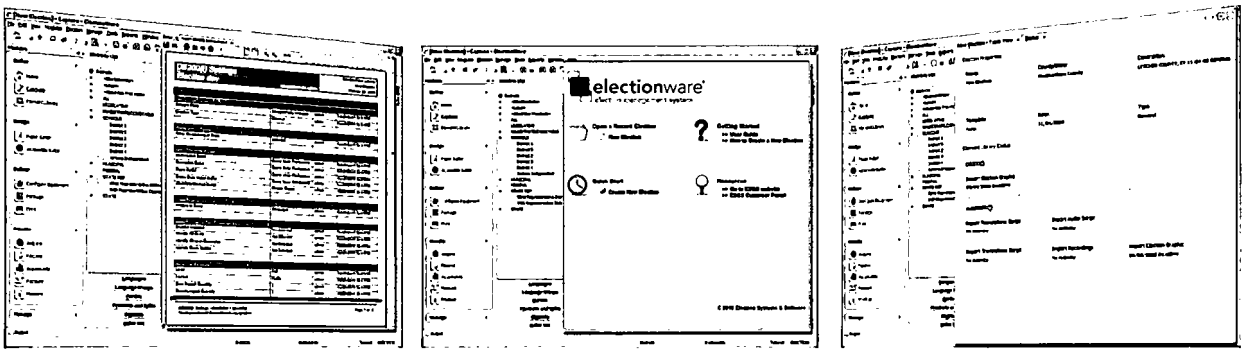
✓ **Purpose-Built System.** The DS850 was built specifically to do exactly what you describe in your goals: "a high speed central count solution to process the large number of mail ballots that are voted in each election, and the Election Day ballots which will need to be tabulated quickly on Election Night." The DS850 is not a scanner that has been postured to act like an election tabulator – it was built from the ground up to scan election ballots.

✓ **Built to Last.** The DS850 was built with sustainability in mind. Each unit is designed to last for 13 to 15 years or even more.

ElectionWare and ERM. ElectionWare and Election Reporting Manager (ERM) comprise ES&S' election management system (EMS) software. Our EMS solution manages the entire election process from beginning to end. Our EMS software enables users to create an election information database, format ballots, programmatically configure ballot-scanning equipment, create voice files, count ballots, and generate results reports. ES&S software products allow users to customize and scale election processes to meet the needs of any jurisdiction size.

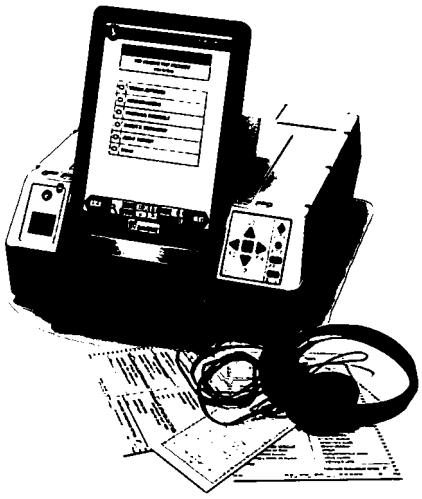
ElectionWare is a fully integrated election management software application that allows customers to carry out election management tasks through a single uniform user experience. It has a powerful and intuitive user interface and a single, common relational database.

ElectionWare addresses customer productivity issues with automation instead of repetition, reuse of previous election data instead of duplicative data entry, and built-in election and ballot templates instead of recreating ballot templates each new election. It also has integrated warning and alerts and configurable levels of security based on the customer requirements.



ElectionWare Benefits

- ✓ **Ease of use.** ElectionWare is easy to understand and use election management system software that eliminates wasted effort on unnecessary tasks.
- ✓ **Single user interface.** The multi-function modules are delivered through a single user interface, streamlining information access to and management of information. Common database and customer-specific settings provide seamless movement between modules, simplifying execution of key tasks.
- ✓ **Online help system.** ElectionWare features an interactive and comprehensive online help system.
- ✓ **Multiuser interface.** ElectionWare functionality for multiple users enables large jurisdictions to use authorized election personnel to simultaneously create precinct memory storage devices and enter information for the DS200, DS850, AutoMARK, and ERM. Additionally, the multiuser functionality in ElectionWare allows multiple teams of election officials to simultaneously work on different elections.
- ✓ **Modernized technology, networked environment.** ElectionWare leverages the power of new technology languages, methods, and networked environments that enables a multiple-user application.
- ✓ **Security.** ElectionWare incorporates the very latest in election security, including built-in heightened audit controls and change management processes that make sure your election data is safe and secure.



AutoMARK Voter Assistance Terminal. The ES&S AutoMARK Voter Assist Terminal helps voters with vision and mobility impairments mark standard paper ballots without assistance. The terminal's robust audio ballot and support for multiple languages also assists voters who are more comfortable reading or hearing ballot contents in an alternative language to cast their vote independently.

AutoMARK Benefits

✓ **HAVA and ADA compliant.** Complies with all HAVA and ADA accessibility requirements for assisting voters with disabilities.

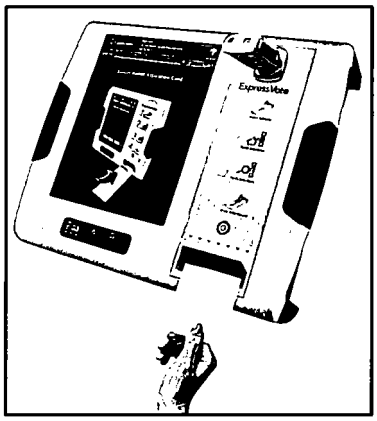
✓ **Easy-to use touch screen.** Vibrant touch screen supports multiple ballot languages.

- ✓ **Eliminates over-voting.** Displays a warning message for voters who over-vote a contest.
- ✓ **Supports write-ins.** Write-in capability for visual and audio ballots.
- ✓ **Easily portable.** Durable carrying case protects the terminal from damage during transport.
- ✓ **Ballot summary screen.** Voters can confirm all selections before marking their ballots.

Blended with Pinal County's Existing ES&S Equipment
ES&S understands your need to integrate our proposed solution with the portions of your current ES&S election system equipment Pinal County wants to retain. The DS850, ElectionWare, and AutoMARK solution we propose will integrate seamlessly with your existing ES&S software:

- ✓ ES&S PowerProfile® Voter Registration System

Migration Plan for Future Needs
In addition to this product solution (collectively known as **EVS5000**), ES&S is proposing that Pinal County eventually take advantage of the future version of the ES&S voting system (**EVS5200**), which is expected to be certified by the U.S. Election Assistance Commission (EAC) in the Summer of 2014.



In addition to enhanced EMS software features, migrating from EVS5000 to EVS5200 would allow Pinal County to upgrade to the **ES&S ExpressVote® Universal Voting System**, which is a leading-edge technology touch-screen device that would *enable voters to vote any ballot in the jurisdiction without the need for paper ballots, saving Pinal County taxpayers' money.* The ExpressVote creates verifiable paper records by printing human- and machine-readable ballot summary cards that would be tabulated by your DS850 central count scanner and tabulators.

The ExpressVote could eventually replace your AutoMARK accessible devices to become the primary ballot-marking device for your polling places.

The ExpressVote was developed with universal design principles applied to be usable by all voters, with or without a disability, without discrimination.

The ExpressVote Universal Voting System combines paper-based voting with touch screen technology to create an innovative breakthrough in voting solutions. Used in early voting places and on Election Day in precincts, the ExpressVote handles it all. Election officials no longer must guess the number of ballots to print. Instead, an inexpensive Vote Session Activator™ card determines the ballot style presented on the touch screen.

The system can serve every eligible voter, including those with or without special needs. The ExpressVote is a feature-rich system created for people with or without visual impairments, hearing issues, or need for physical accommodations.

As a voting solution that's fully compliant with the Americans with Disabilities Act (ADA), ExpressVote enables each voter to cast his or her ballot autonomously.

ExpressVote Benefits

- ✓ **Vote session activator.** The voter receives a voting session activator card to begin the process. Election officials can choose from three options:
  - If only one ballot is programmed for the election, a blank card activates the ballot.

- If the election has multiple ballots, a blank card requires a poll worker to select the correct ballot for the voter.
- If the election has multiple ballots, a card with an activation barcode displays the correct ballot for the voter.

✓ **Verifiable paper record.** After all selections are made, a human- and machine-readable paper record is produced, including text and an optical scan barcode. All votes are digitally scanned for tabulation on ES&S' DS850 devices.

✓ **Easy to set up and use.** The one-step startup and poll-closing procedure makes the ExpressVote an ideal device for poll workers. The intuitive design offers streamlined simplicity for all voters, poll workers, and election staff. The paper card is the vote session activator – there is no expensive technology to manage or program. The ExpressVote is small, lightweight at less than 20 pounds, and easy to carry.

✓ **Controlled and reduced costs.** Traditional ballot printing costs can be reduced significantly by eliminating the need and expense for pre-printed paper ballots. With low operation and maintenance fees, budgeting for recurring expenses becomes easy with the ExpressVote. The system does not use ink, toner, or paper rolls and consumes 70 percent less paper than traditional ballots.

✓ **Innovative design.** Complete and total independence is maintained while voters cast their own records. Voters review a summary page and can make changes before casting ballots. A voter's selection changes will not spoil the voting session. The system produces a verifiable paper record for each voter that is digitally scanned for tabulation. ExpressVote neither stores nor tabulates vote counts. The system is secure: the election definition media device is protected in a locked environment.

✓ **Casting options.** The ExpressVote enables casting options. Voters can:
- Allow the ExpressVote to return the marked paper card and then manually place the card into a secure ballot contained for tabulation by the DS850.
- Allow the ExpressVote to use AutoCast™ to cast the marked card into a secure container attached to the ExpressVote for later tabulation by the DS850.

Leading-Edge Election Solutions: Backed by the ES&S Team

ES&S offers Pinal County the most Arizona election experience of any comparable vendor.

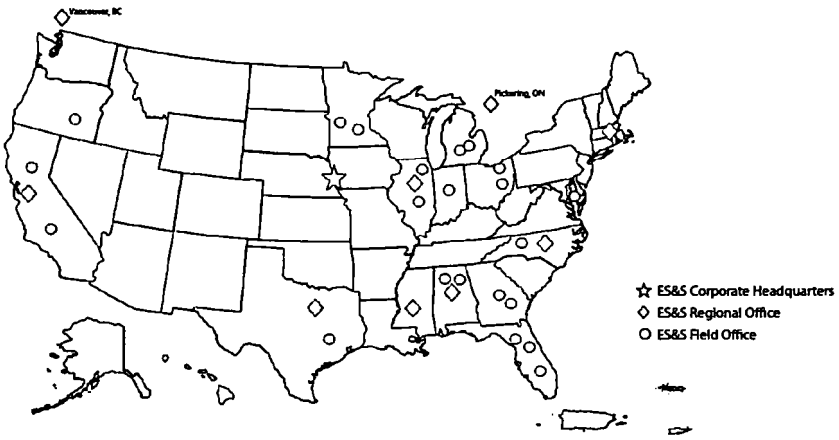
Strengths	Benefits
Current relationship with Arizona clients	• ES&S has more than 27 years of experience supporting Arizona counties using ES&S equipment. We are experts on Arizona election laws and our customers' needs. If awarded the bid, we can hit the ground running.
ES&S' financial strength is unmatched by any vendor in the industry	• Capacity to scale our solution to Pinal County's needs, providing a technically robust and financially responsible solution.

Strengths	Benefits
Vote tabulation experience	• 35 years of ballot tabulation experience is at your service. Our team has unmatched knowledge and experience preparing, maintaining, and conducting Arizona elections.
ES&S is the elections industry leader	• Being Number 1 demands accountability. Our commitment, dedication, and credibility in the industry will give you assurance that your elections will be accurate, safe, and secure.
Experience with Arizona's election rules and regulations	• Familiarity with Arizona's election processes and procedures and years of working with Arizona counties has given us the experience you can count on.
The DS850 is designed for speed and efficiency	• Ballots will be scanned at more than 300 ballots per minute without stopping to count over-votes, under-votes, and write-ins.

Our Company

Election Systems and Software, LLC (ES&S) is the largest elections-only company in the world and has been providing election equipment and services for more than 35 years.

ES&S North American Operating Locations



Today, not only do we work with many of the same customers we've served for more than four decades, but our business has grown to serve 41 states and includes more than 4,500 clients. ES&S currently serves more than 2,400 of the 3,140 county-level governments across the United States.

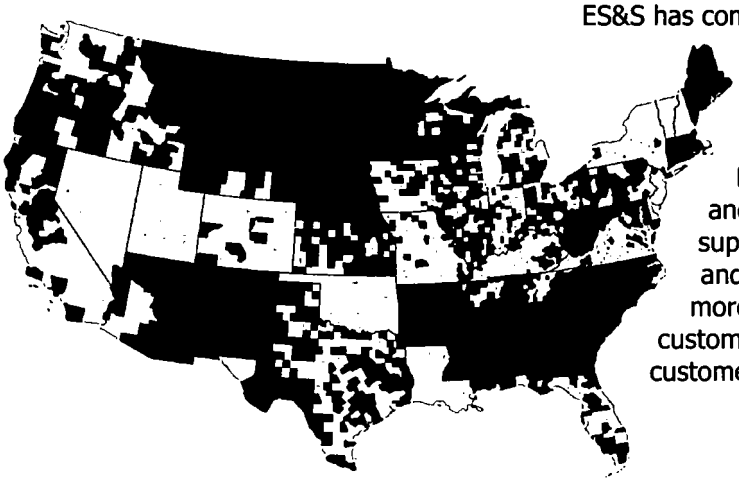
ES&S is a privately owned Delaware limited liability company that entered the elections industry in 1979. The company was initially incorporated in 1979 as American Information Systems and subsequently incorporated as ES&S in 1997 upon its acquisition of the elections division of Business Records Corporation. On September 2, 2009, ES&S acquired the assets of Premier Election Solutions and Premier-Canada. Effective October 1, 2011, Premier was merged with and into ES&S and ES&S changed its form of legal entity from a C-corporation to a Delaware limited liability company.

ES&S maintains a staff of more than 450 election professionals. Our company headquarters is located in

Omaha, Nebraska, and is staffed by more than 200 full-time employees. To achieve our vision of greater efficiency and accessibility to our customers, we have employees positioned from coast to coast to ensure we maintain voter confidence and enhance the voting experience for all our customers. The company maintains 10 facilities across the United States as well as two Canadian field offices in Pickering, Ontario, and Vancouver, British Columbia.

ES&S is the world's most experienced provider of total integrated election management solutions. No other voting system vendor can compare to the financial stability and customer base of ES&S. ES&S is a well-capitalized, professionally managed company, capable of continually sustaining high-quality development and support to our customers for the long term. We have installed more than 260,000 voting systems, more than 15,000 electronic poll books, and have supported more than 75,000 elections during the past decade alone.

We provide our large customer base with products and services that includes voting system hardware and software sales and support, ballot layout/coding/voice file production, equipment maintenance and support, onsite support for pre-election testing and Election Day activities, around-the-clock technical and customer support, project management and implementation services, voter registration services and support, ballot printing, vote-by-mail packet processing and mail services, electronic ballot delivery software and services, electronic poll book sales and services, and voting system consumables and supplies.



ES&S has completed successful installations of statewide voting systems in Alabama, Arkansas, Georgia, Idaho, Iowa, Maine, Maryland, Minnesota, Mississippi, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Rhode Island, South Carolina, South Dakota, and West Virginia. From our humble beginnings supporting a handful of election administrators and voters in 1979, we have grown to capture more than 62 percent of the market share of customers voting on ES&S equipment (ES&S customers shown in dark blue).

Why Choose ES&S?

ES&S offers Pinal County the right design implemented, serviced, and supported by a team of knowledgeable professionals who have decades of experience helping our customers achieve their voting system modernization objectives. Above all, we offer you the promise of outstanding support and customer service.

Doing business with ES&S provides Pinal County:

- ✓ **Proven financial stability.** Pinal County has the peace of mind and security knowing that ES&S is the most experienced, financially sound election company in the United States. With more than 35 years of elections experience and more than 450 full-time employees, ES&S is well positioned to support Pinal County for years to come.
- ✓ **Local support.** ES&S' Regional Sales Manager for Arizona has an office in Phoenix.
- ✓ **Continual improvement.** ES&S has a long and continuing history of client-focused feedback sessions that help us improve our voting equipment.
- ✓ **The ability to meet delivery and support service timelines.** ES&S has the capacity to

meet delivery requirements for voting systems and required support services.

- ✓ **A proven, successful solution and experienced project management team.** ES&S will have all of your equipment in Pinal County by May 19, 2014, for your inspection and acceptance.

Summary

ES&S is proposing for Pinal County a state-of-the-art voting system that takes advantage of the latest in central count tabulator technology while seamlessly integrating with your existing ES&S equipment.

Plus, ES&S has its eye on the future of voting for Pinal County with our proposed migration from EVS5000 to EVS5200 with support for the ExpressVote Universal Voting System.

And as you know from experience, our ES&S team of customer support and technical support experts will be available to assist with any questions or concerns that may arise.

No other vendor can match ES&S' capabilities and proven track record. We look forward to future successes as we provide Pinal County with ES&S' unparalleled integrated election products, service, and support.

Thank you for the opportunity to respond to your Request for Proposal and for consideration of our products and services.

Section 1

Title Page

Enhancing the Pinal County Election Process

RFP #PC-131219 – Elections Equipment and Maintenance
Due Date: April 11, 2014

ES&S Solicitation Contact Person:
Seirra Seeley, Arizona Regional Sales Manager
6229 N. Via Paloma Rosa
Tucson, AZ 85718
(480) 606-2300
seirra.seeley@essvote.com

Offer & Acceptance
Form

Addendum Acknowledgement Form

PINAL • COUNTY *wide open opportunity*	**Addendum Acknowledgement Form RFP PC-131219 Elections Equipment and Maintenance**	Pinal County Finance Department 31 N. Pinal St. Bldg. A P.O. Box 1348 Florence, AZ 85132

ADDENDUM ACKNOWLEDGEMENT FORM

Solicitation Addendums are posted on the Pinal County website at the following address: http://pinalcountyaz.gov/Departments/Finance/Pages/BidsProposals.aspx . It is the responsibility of the Responder to periodically check this website for any Solicitation Addendum.

This page is used to acknowledge any and all addendums that might be issued. Any addendum issued within five days of the solicitation due date, will include a new due date to allow for addressing the addendum issues. Your signature indicates that you took the information provided in the addendums into consideration when providing your complete response.

Please sign and date:

ADDENDUM NO. 1 Acknowledgement _____ 4/8/14
Signature Date

ADDENDUM NO. 2 Acknowledgement _____
Signature Date

ADDENDUM NO. 3 Acknowledgement _____
Signature Date

If no addendums were issued, indicate below, sign the form and return with your response.

Election Systems & Software, LLC
Firm

_____
Authorized Signature

W-9 Form

RESPONDERS CHECKLIST

	Yes/No
Did you sign your Offer sheet? *See Page 31 & 32 of this solicitation.*	Yes
Did you acknowledge all addendums, if any? *See page 28. Any addendums would be posted on the Pinal County website on the Bids/Proposals page of the Finance/Purchasing Department.*	Yes
Did you complete all required Response Forms? *Any Response forms would be posted on the Pinal County website on the Bids/Proposals page of the Finance/Purchasing Department.*	Yes
Did you include your W-9 Form? *See page 29 of this solicitation.*	Yes
Did you include any necessary attachments?	Yes
Is the outside of your sealed submittal marked with the Solicitation #, Due Date and Time? *See page 1 for this information.*	Yes
Did you include one original and the required number of copies? *See page 1 for the quantity.*	Yes
Did you follow the order for submissions of documents? *See Section 3.4 – Offer format in the Special Instructions of this solicitation.*	Yes
Did you include proof of insurance(s) if requested?	Yes

Response Form 1

Responder Name: ***Election Systems & Software, LLC ("ES&S")***

Responders shall complete the following Response Form, indicating their responses in the spaces provided. Additional pages may be added so long as they are clearly referenced in the spaces provided.

Please note: Any exception and the total number of exceptions taken will negatively affect your evaluation score. Compliance to Terms and Conditions has been identified as an evaluation criterion for this solicitation.

Any exception not contained within this section of the solicitation will be deemed invalid and will not be considered.

Acceptability of Responses

Offers that do not include fully completed copies of Response Forms 1, 2 and 3 may cause the entire offer to be deemed unacceptable and therefore non-responsive. Forms with incomplete or unacceptable responses will also be considered non-responsive.

1 Capacity of Responder

1.1 Responder shall list the following:

Company Name: ***Election Systems & Software, LLC***

Company Address: ***11208 John Galt Blvd.; Omaha, NE 68137***

Company website: ***www.essvote.com***

Number of years in the Market: ***35***

Ownership (public, partnership, subsidiary etc.): ***Private, Limited Liability Company***

Local Office Address: ***6229 N. Via Paloma Rosa; Tucson, AZ 85718***

Contact Person's Name: ***Ms. Seirra Seeley***

Contact Person's Phone Number: ***(480) 606-2300***

Contact Person's Email: ***seirra.seeley@essvote.com***

List All Subcontractors: ***None***

List key personnel who will work on this project with their function and job title: ***Roberta Shoemaker, PMP®, Project Manager; Chris Moody, Project Manager; Dean Baumert, DS850 Technical Lead.***

1.2 Responder will state whether in the past five years, your company has been involved in any lawsuit or legal proceeding (including arbitration or mediation), or request for indemnification regarding or related to the product(s) and/or services requested in this RFP. If so, please summarize the situation and the outcome or resolution of the same.

ES&S has not, in the past five years, been involved in any lawsuit or legal proceeding (including arbitration or mediation), or requests for indemnification regarding or related to the products and/or services requested in the RFP.

1.3 Responder shall provide audited financial reports for the last two (2) years. Responder shall also provide their credit rating and Dunn & Bradstreet number.

ES&S has provided copies of its last two (2) years of audited financial reports at Appendix A. We have also provided you a copy of our credit rating from Dunn & Bradstreet dated 9/6/2013 at Appendix B. The credit rating on that report is 4A3.

1.4 Responder shall identify three (3) reference customers that are currently using the hardware/software you are quoting in this Proposal. You should identify reference customers that most closely match the requirements in this RFP, regarding size, complexity, and implementation process.

Client	Hennepin County, Minnesota
Contact name	Ginny Gelms, Election Manager
Address	300 South 6th Street Minneapolis, MN 55487
Telephone	612-348-5151
Email	virginia.gelms@co.hennepin.mn.us
Equipment	DS850, DS200, AutoMARK, ElectionWare

Client	Kootenai County, ID
Contact name	Carrie Phillips, Election Manager
Address	1808 N. 3rd Street; Coeur d'Alene, ID 83814
Telephone	208-446-1035
Email	cphillips@kcgov.us
Equipment	DS850, AutoMARK, Unity EMS

Client	Duval County, FL
Contact name	Stan Bethea, Director of Elections
Address	105 East Monroe Street; Jacksonville, FL 32202
Telephone	904-630-1414
Email	sbethea@coj.net
Equipment	DS850, DS200, AutoMARK, ElectionWare

Additionally, Responders shall list clients who have terminated services within the past five (5) years, indicating reasons for termination. Provide the firm name, contact person, address, email address and phone number of each referenced organization.

Responder must include phone, fax, email and physical address of each reference.

No DS850 or ElectionWare EMS customers have terminated services within the past five (5) years. This provides testimony that our DS850 and ElectionWare products are satisfactorily meeting our customer's expectations.

1.5 Responder shall list governmental entities where their system (hardware/software) is operating.

The following government entities utilize the DS850 and/or ElectionWare EMS:

ElectionWare Customers		DS850 Customers		
Alberta, Canada Town of Strathmore **Florida** Duval County Escambia County Nassau County **Minnesota** Washington County Hennepin County **Mississippi** Hinds County	**New York** Albany County Erie County Nassau County City of New York Rockland County Schenectady County	**Alabama** Madison County Mobile County Tuscaloosa County **Colorado** Colorado Springs **Florida** Lee County Duval County Nassau County Brevard County Escambia County **Montana** Big Horn County Gallatin County Lewis & Clark County Flathead County Yellowstone County	**Idaho** Kootenai County Woodbury County **Iowa** Pottawattamie County **Nebraska** Lancaster County **New Jersey** Bergen County **New York** Erie County	**Ohio** Mahoning County **Oregon** Lane County **Washington** Thurston County Whitman County **West Virginia** Harrison County **Wyoming** Natrona County

2 Method of Approach

2.1 Responder shall identify any potential issues concerning implementation by Pinal County's May 19, 2014 deadline.

ES&S' Pinal County project team has carefully reviewed your Request for Proposal and anticipates no issues with implementing your voting system by the May, 19, 2014 deadline.

ES&S is the election industry leader with a track record of over 35 years of successful election implementations. We will work hard to ensure that Pinal County's implementation meets all deadlines to ensure an efficient and accurate voting process for all citizens in your county.

Only a company with the size and breadth of ES&S can provide Pinal County the resources and experience to achieve safe, secure, and efficient elections. The combined election experience of our full-time workforce exceeds 4,000 years of experience. Our competition is stretched thin to accomplish what we do so easily.

2.2 Responder will identify and describe their strategic long range plans.

ES&S has a proven, extended record of success introducing new technologies, developing innovative services and products, and adapting to the needs of the elections industry. We continually design, test, and introduce new hardware, software, and firmware to support the process and make systems easier and more reliable for election officials.

Our robust research and development department includes experienced and highly-trained electronic and software engineers, quality assurance analysts, software testers, documentation personnel, and certification specialists.

ES&S' future development efforts are focused on creating and an end-to-end voting experience that demonstrates election solutions that address some of the most important concerns of both citizens and governments:

- ***Voter convenience and voter turnout***
- ***Managing the polling place***
- ***Efficient and effective election administration***

As jurisdictions continue to look at the "future of voting," we think it's important that they understand that ES&S solutions are built using a unique architecture that will allow states and counties to provide cutting-edge voting technology today and into the future without the need to replace the system each time a new capability or technology is desired.

2.3 Responder will provide a detailed timeline of their proposed implementation plan, including all significant milestones and ability to meet delivery dates. All milestones, including installation, training, acceptance testing and revisions, must be complete and the system fully operational by May 19, 2014 for the August 2014 Primary.

ES&S has provided a detailed Preliminary Project Plan and timeline that will allow the new County voting system to be fully operational by May 19, 2014.

2.4 Responder shall provide evidence of SOS Certification for their proposed solution/products on or before April 21, 2014 at 5:00 pm Arizona time.

The proposed voting system (EVS 5.0.0.0) which includes ElectionWare EMS, DS850, and the AutoMARK was certified by the Arizona SOS Bennett on June 13, 2013. A copy of the approval letter is located at Appendix C.

2.5 Responder will delineate any environmental control requirements (i.e. raised floors, special air conditioning requirements etc) necessary for their proposed solution/products.

The proposed voting system does not require any environmental control requirements to operate the system.

2.6 Responder will identify any specific personnel requirements on behalf of the County needed for implementation of their proposed solution.

ES&S recommends that the County identify a main point of contact that our designated Project Manager will work with to complete all deliverables within the Statement of Work. In addition, if the County elects to incorporate the EMS and/or multiple DS850's into a closed network, the County will need to designate a lead within your IT department to facilitate the network integration. Also, suggest the County designate individuals who will assist ES&S during the Acceptance testing of the proposed hardware and software deliverables. Finally, the County will need to designate staff members who will be trained to operate the DS850 central count and AutoMARK Voter Assist Terminal; and conduct election programming using ElectionWare EMS software.

2.7 Responder will specify if their solution is "off the shelf" or if Responder customization is required.

The hardware and software components that comprise the proposed ES&S voting system are proprietary, certified products that require no customization to meet your requirements and are delivered ready to use.

Training & Support

2.8 Describe the proposed training plan for Pinal County staff on programming proposed hardware/software, to include ballots, peripherals, administrative functions etc. when using your system. This should include number of hours of live instruction, training materials available, number of staff that can be accommodated per training session, and additional cost of training, if any, and where training would occur.

See Question 2.8 in Attachment 1, Features Questionnaire Responses, for ES&S' proposed training plan for Pinal County. Training costs are included in Response Form 3 – Pricing Sheet.

2.9 Describe the types of poll worker training materials available (printed material, videos, etc.) and whether included in proposal or available at additional cost.

Well-written training documentation that is easy to understand and can be easily referenced will be provided to each participant who attends training. Training materials for participants are included with our proposal.

2.10 Describe the approach used in providing hardware and software support. This should include type of support available (remote/on site), hours available, topics supported (hardware troubleshooting, election programming), and additional cost for access. Also provide a proposed Service Level Agreement (s).

See Question 2.10 in Attachment 1, Features Questionnaire Responses, for ES&S' hardware and software support approach. Any costs are included in Response Form 3 – Pricing Sheet.

Technology Features

2.11 Describe system capabilities with regard to retrieval of ballot images, if any. Include how images are accessed and by whom, security features around access, file types supported, description of protocol used to de-couple ballot image from voter order, and any other ballot image search or adjudication features.

See Question 2.11 in Attachment 1, Features Questionnaire Responses, for ES&S' information about the voting system's ballot-imaging capabilities with regard to retrieval of ballot images.

2.12 Describe in detail the security protocols included in the system for maintaining integrity and preventing or revealing tampering with results including export/import of cast vote records, automatic tabulation, etc. as applicable.

See Question 2.12 in Attachment 1, Features Questionnaire Responses, for information about system security protocols.

2.13 Document threshold for percentage of target marked that will cause mark to count (both ballot counter and central count components).

ES&S does not use primitive threshold-only programs to validate a voter's mark – our patented methodology is much more accurate and results in a 99.9% mark detection reliability. See Question

2.13 in Attachment 1, Features Questionnaire Responses, for information about ES&S' patented Intelligent Mark Recognition™ (IMR) technology.

2.14 Document the core database program on which the Election Management System is based. Include any additional costs to Pinal County to provide database program.

ElectionWare stores data for each election separately in a PostgresSQL 8.4 relational database management system. See Question 2.14 in Attachment 1, Features Questionnaire Responses, for information. Any costs are included in Response Form 3 – Pricing Sheet.

2.15 Describe Federal certification process and list exact components that were certified as a complete system. Include any hardware or software items that are or may be considered legacy equipment.

See Question 2.15 in Attachment 1, Features Questionnaire Responses, for information about the federal certification of ES&S' EVS5000.

2.16 Describe the user interface for setting up and programming an election, including features for rotation of candidate names, setting up districts and precincts, and multiple ballot options.

See Question 2.16 in Attachment 1, Features Questionnaire Responses, for information about ES&S' ElectionWare user interface.

Accessible Voting Equipment for individuals with disabilities

2.17 Describe the ADA unit, including any peripherals (carrying cases, headphones, etc.) Document any optional equipment not included in Cost Proposal.

See Question 2.17 in Attachment 1, Features Questionnaire Responses, for information about ES&S' AutoMARK® Voter Assistance Terminal System. Also refer to AutoMARK Operator Guide at Appendix I.2 for a complete description of the features and functionality of the AutoMARK.

2.18 Describe the user interface for poll workers (e.g. warning messages, low battery indicator, instructions, battery power/life indicator, etc.) Document any customizable options.

The AutoMARK's touch-screen monitor provides simple instructions and indicators for both poll workers and voters. The touch screen displays all ballot, language, and font selections as well as system messages, instructions, and terminal settings.

Each AutoMARK device has LED light indicators to determine when it is running on external power or battery. An alert message is also displayed on the voter-facing screen (and audio) if the battery level becomes low but will allow for the voter to complete their voting session. It also will display an alert message if the battery level gets to a very low state and will not allow for a voter to begin a session.

Calibration of the each AutoMARK device is normally conducted as part of the polling place setup for each election, but can be completed at the polls, if necessary, to ensure voting accuracy. The system will provide a series of prompts for the poll worker to touch various locations on the touch screen user interface to calibrate the system. The system does not produce a warning when calibration needs to be reset.

2.19 Describe the user interface for Pinal County staff (e.g. diagnostic tests, warning messages, instructions, ballot test, logic & accuracy test, etc.)

The user interface for poll workers and Pinal staff is the same. See Question 2.19 in Attachment 1, Features Questionnaire Responses, for information about how poll workers and staff can use the interface to perform testing and prepare a device for Election Day.

2.20 Describe the user interface for voters, including steps required by the voter to utilize ADA equipment. Document types of accessibility tools provided and/or available for voters to use.

See Question 2.20 in Attachment 1, Features Questionnaire Responses, for information about the user interface and accessibility tools for AutoMARK devices.

2.21 Describe the security measures employed to prevent a voter from voting twice.

The County's normal duplicate ballot-casting prevention measures can be applied to ballots cast with AutoMARK devices and should prevent a voter from voting twice. In addition, physical security measures during Election Day prevent unauthorized access to the AutoMARK devices, ensuring the devices cannot be tampered with for vote manipulation. These include:

- ***Data card compartment is key-locked and has a place for the county to add a tamper seal.***
- ***All data is protected with a secure hash code.***
- ***Upon starting the AutoMARK system, data is decrypted against a PIN entered by the jurisdiction. If any files have changed, the system will alert the user and will not continue until the issue is resolved.***
- ***All AutoMARK ports, doors, openings and data access points are protected by lockable, sealable plastic doors to protect access and allow election officials to easily detect unauthorized access.***

2.22 Document dimensions and weight of equipment.

See Question 2.22 in Attachment 1, Features Questionnaire Responses, for information about the dimensions and weight of the AutoMARK device and carrying case.

2.23 Document which parts are user serviceable.

The following AutoMARK consumables are serviceable by the user: flash card, ink cartridge, and ink cartridge wiper. The backup battery and coin cell battery should be replaced by a trained ES&S technician.

2.24 Document all expendables / consumables and types - printer paper, ink cartridges, memory media, battery, etc. - and if replacements are commercially available.

Since the AutoMARK only prints on inserted ballot documents, it has no internal paper supply. The only consumable that may need to be changed by a staff member or poll worker is the inkjet print cartridge manufactured by Hewlett-Packard, which can be purchased commercially or from ES&S. It is recommended that the cartridge be replaced before every election.

Replacement compact flash memory cards and touch screen clean cloths can be purchased commercially or from ES&S.

The backup battery and coin cell battery should be purchased from ES&S and replaced only by an ES&S trained technician.

2.25 Document expected battery run time.

The internal lithium-ion backup battery has been thoroughly tested to meet and exceed the 2005 VVSG requirement of a minimum of two hours of battery operation in the case of power loss. Anticipated longer periods of time between voting sessions or turning the power key off between voting sessions will significantly extend the battery life and allow the equipment to achieve a four-hour battery life.

2.26 Document types of automatic diagnostic tests available to run before polls are opened and while polls are open.

See Question 2.26 in Attachment 1, Features Questionnaire Responses, for information about available AutoMARK diagnostic tests.

2.27 Describe user interface for multi-language ballots.

The AutoMARK is language agnostic and is only limited by the languages supported in ElectionWare. The election definition files contained on the CF card determines the languages that are visually and audibly supported. Audio support is conducted by the use of WAV files which can be created using human recorded speech or through text to speech converters used as a tool for WAV file creation. ElectionWare supports file exports and imports to facilitate getting text

translations and audio files into its database for used in creating the election definition for the AutoMARK.

These AutoMARK language capabilities ensure that citizens in a diverse population are free to exercise their privilege to vote unassisted in their native language.

2.28 Describe storage and transportation features of ADA unit and peripherals.

The AutoMARK durable, hard-shell case measures 27.7 inches wide by 37.7 inches in length by 14.1 inches high. With the handle extended, the length of the case is 41.2 inches. The empty case weighs 36 pounds. The telescoping handle and ruggedized wheels allow easy transport from storage to polling place. The case is designed to be stacked up to five units high during storage or transport. The interior of the case is designed to allow storage of all accessories needed to operate the ES&S AutoMARK. An external battery charger is used to charge an AutoMARK unit in its case.

The size of the storage space is fitted to carry only the essential components of the system. ES&S recommends that clients consider using separate transport cases for additional supplies or the use of a transport cart to deliver the AutoMARK and any peripherals or supplies to the polling location.

2.29 Describe recommended user maintenance. Provide details of features included for efficiency in maintenance (e.g. units can be daisy-chained to charge, units can be charged while in carrying case, etc.)

See Question 2.29 in Attachment 1, Features Questionnaire Responses, for information about the AutoMARK's maintenance.

2.30 Describe method for generating audio feature (e.g. computer generated, live recording, etc.)

Audio support is conducted by the generation of WAV files which can be created using human recorded speech or through text to speech converters used as a tool for WAV file creation. ElectionWare supports file exports and imports to facilitate getting text translations and audio files into its database for used in creating the election definition for the AutoMARK.

Central Count

2.31 Document the type of reports available for printing directly from central count device site, including reports available prior to and following closing of polls on the device.

See Question 2.31 in Attachment 1, Features Questionnaire Responses, for information about printable DS850 reports.

2.32 Document speed at which non-folded ballots are processed in ballots per minute for various supported lengths.

The DS850 nominal processing speed for non-folded ballots in ballots per minute (bpm):

– 11 inches - 368 bpm
– 14 inches - 300 bpm
– 17 inches - 250 bpm
– 19 inches - 200 bpm

2.33 Document the speed at which folded ballots are processed, including if different speeds specific to half folded, "Z" folded, and tri-folded or letter folded ballots of various supported lengths.

With the DS850 TruGrip and patented S-curve design, the nominal processing speed for folded ballots is the same as that for non-folded ballots, assuming the appropriate level of ballot preparation has been performed to allow the ballots to be separated from the input stack at high speed.

2.34 Document all expendables / consumables and types - printer paper, ink cartridges, memory media, battery, etc. - and if replacements are commercially available.

See Question 2.34 in Attachment 1, Features Questionnaire Responses, for a list of DS850 consumables. All consumables are commercially available.

2.35 Document included peripherals such as external printers, cases, tables, covers, etc. Document any optional equipment not included in Cost Proposal.

See Question 2.35 in Attachment 1, Features Questionnaire Responses, for peripherals and accessories that are included in our Cost Proposal for the proposed DS850.

2.36 Describe the user interface for Pinal County staff (e.g. diagnostic tests, warning messages, instructions, ballot test, logic & accuracy test, etc.)

See Question 2.36 in Attachment 1, Features Questionnaire Responses, for information about DS850 user interfaces.

2.37 Document all sorting/out-stacking options, including any customizations.

The DS850 has three programmable output bins:

1. ***Main Output Bin. This motorized bin, which can hold up to 400 flat ballots, is used for all processed ballots that do not meet one of the selected sort criteria (over-votes, under-votes, write-ins, crossovers, unclear marks, and blanks).***
2. ***Write-in Bin. This fixed bin (in the middle) can hold up to 150 flat ballots. This bin can be configured to receive counted write-in ballots that the administrator wants physically separated to allow for manual retrieval or verification of the candidate receiving the write-in vote.***
3. ***Unprocessed Bin. This fixed bin (at the top) can hold up to 150 flat ballots. This bin can be configured to received unreadable ballots (multi-feeds, too long or short, and unreadable) and ballots out-stacked for a criteria that has been selected (over-votes, under-votes, write-ins, crossovers, unclear marks, and blanks).***

Sorting occurs without stopping the DS850. This capability will allow Pinal County to achieve its goal for completion of counting the ballots on Election Night in minimum time.

2.38 Document type of printer (external or internal, thermal, dot matrix, inkjet, etc.).

The DS850 uses a USB-attached, high-speed laser printer for report printing and a USB-attached, continuous feed dot-matrix printer for real-time audit log printing. More details about the printing equipment can be found in the response to Question 2.35.

2.39 Document number of precincts and/or ballot styles capable of being stored on a single memory medium.

The DS850 removable USB flash drive is capable of storing up to 9,900 precincts and 9.900 ballot styles on a single memory stick.

2.40 Document number of orientations in which both folded and non-folded ballots may be counted.

The DS850 can scan both folded and non-folded ballots in all four orientations.

2.41 Document expected battery run time.

In case of a power outage, the uninterruptible power supply (UPS) provides a minimum of two (2) hours of uninterruptible power to the DS850. When facility power is lost, the DS850 seamlessly transitions to provide power to protect against data loss. The DS850 was certified using an external UPS to comply with electrical test requirements in the EAC VVSG. The DS850 must be operated with the UPS to be in a certified configuration.

Results and Reports

2.42 Document types of results and canvass reports available and customizable options for each. Describe options for data export and customization.

There are essentially two types of reports available in Election Reporting Manager (ERM): Summary and Canvass.

Summary Reports are available on a precinct or election level and can include group breakdown. Summary reports allow for the inclusion and exclusion of over-vote and under-vote reporting, date and time stamp, page number, and one- or two-column format.

Canvass Reports are available with two different key layouts: name or number. Canvass reports allow for the inclusion and exclusion of over-vote and under-vote reporting, date and time stamp, page number, precincts reported line, and totals only (without detail).

Data export files can be edited with commercially available spreadsheet software (such as Microsoft Excel) with cast-vote record contest selections in separate rows and a column for each available contest selection.

2.43 Document types of pre-election and post-election reports available and customizable options for each.

Our Election Reporting Manager (ERM) software application will be used to accumulate cast vote data from the DS850 removable memory devices. ERM is capable of creating a variety of hard copy or electronic reports for Election Night and during canvass operations. The reports can be printed in a variety of formats, displayed on the County website, or displayed on a monitor in a central viewing area of the County election headquarters.

ERM produces both pre-formatted reports and real-time querying and reporting of listed election data. Real-time reports can be filtered for any or all attributes and associations of any data element and then exported to an Excel spreadsheet.

Election Reporting Manager allows for various Election Day reports. When setting up the election database, ERM utilizes what are known as "groups". Up to 14 groups can be created in ERM and these groups are then used to report for various specific categories within your election. For example, ERM allows for creating Election Day, early voting, and absentee groups. Additionally, you also have the ability to provide election total reports that are non-specific to any of the aforementioned groups.

Election Reporting Manager's powerful report editing features allow jurisdictions to create custom-designed reports from election results data. Through Election Reporting Manager, election officials can produce periodic reports of precincts reporting, precincts not reporting, and precincts partially reporting without disrupting other functions.

2.44 Document types of central count reports available (e.g. cards cast report, results by batch report, etc.)

Before ballots are scanned on the DS850, a Zero Report can be generated, which is a full results report that can only be generated when no ballots have been scanned. This provides a clear indication that the DS850 has been cleared for the election.

Once ballots have been scanned, Bin/Batch Reports are available for each output bin upon the saving of a batch. Bin Reports can be set to automatically print a configurable number of copies and provide a summary level report of ballots processed and out-stack reports that indicate all out-stack criteria that were met down to the contest level.

Before and during an election, a Precincts Processed Report is available. As desired, Results reports can be generated for public reporting or with additional detail required by administrators at both an election level or at a precinct level.

Additional information about reports can be found in the response to Questions 2.31 in Attachment 1, Features Questionnaire Responses,. and also Chapter 8 of the "ES&S DS850 Operator's Guide" located in Appendix I.1.

2.45 Describe system capabilities with regard to managing counter groups.

Every precinct is automatically included and available for each counter group. The ERM reporting software can accommodate up to 14 groups, with each precinct included.

ElectionWare allows the same ballot style to be used in any counter group assigned to the precinct, regardless of counter group and precinct arrangement. For example, the same ballot style can be used for an Absentee Counter group or as an Election Day counter group.

Ballots

2.46 Document ballot layout options, including support for number, types, and placement of columns, portrait or landscape layout, number and placement of vote targets, header shading options, header space requirements, font types and sizes, independence of front and back designs, ballot length options, etc.

ElectionWare's Paper Ballot design tool would give Pinal County a flexible and innovative ballot layout system capable of grid-portrait, grid-landscape, and multicolumn-portrait ballot types.

The ElectionWare Paper Ballot module can produce up to 9,900 ballot types, the ability to place upward of 2,184 voter targets per side of the ballot, as well as numerous font, header shading, text, and rotational options. In a column-portrait format, users can create various sized columns. For example, ballot sides can be set from one to four columns wide, and narrow columns can be mixed with wider columns.

The DS850 supports a variety of ballot sizes that include (in inches) 8.5 x 11, 8.5 x 14, 8.5 x 17, and 8.5 x 19.

Font usage is very flexible. Any font saved on the system can be used at any size needed. Ballot contents can use kerning plus any combination of font styles, such as bold, underscored and italics.

The ElectionWare Paper Ballot module can be used to create ballot formats for ES&S ballot services, for a partner printer that uses your layouts to print official ballots, or use the layouts you create with Paper Ballot to print extra Election Day ballots with ElectionWare's Print module.

2.47 Describe in detail the steps required for Pinal County to setup and program EMS, including average estimate of time required.

See Question 2.47 in Attachment 1, Features Questionnaire Responses, for information about the steps required for Pinal County to setup and program the ElectionWare EMS, including an average estimate of the time required to complete the tasks.

2.48 Describe on-screen options for paper and ADA ballot previews.

ElectionWare's Paper Ballot feature allows the user designing a ballot to preview a paper ballot onscreen throughout the creation process, including the final product.

For the AutoMARK ADA-accessible device, ElectionWare's Preview AutoMARK Ballot feature can be used to preview an emulation of the ballot as it will appear to voters on the AutoMARK terminal. Preview Mode will give you a good idea of how your election will appear on the AutoMARK. The size of your monitor will affect how the preview appears. Viewing the election in Preview Mode enables you to identify any problems before loading the election onto the AutoMARK.

2.49 Describe number and types of language support for both paper and Accessible Voting Equipment ballots, including required steps to add an additional language.

ElectionWare's Capture module provides certified support for nine languages: English, Spanish, Chinese, Korean, Japanese, Vietnamese, Tagalog, Creole, and Russian. These languages can be used to produce visual ballots (both paper and onscreen) as well as audio for AutoMARK ballots using the ElectionWare Toolbox utility. The system can be updated to support other languages, if requested.

ElectionWare can add additional languages to both paper ballots and audio shortly after installation of the program. The Add Language option in the Capture module enables you to add languages to the current election. These languages can later be grouped for application to particular precincts.

All English and non-English languages must first be entered into the Capture module of ElectionWare. The Capture module allows the user to identify each language required in an election. For example, a three-language election may consist of English, Spanish, and Chinese.

Once each language has been identified, the Capture module dynamically creates language-specific data entry screens for all required election information. The jurisdiction is responsible for all language translations and entering them into ElectionWare. The software does not automatically translate English into foreign languages.

2.50 Document options available for multi-language ballots (e.g. more than one language can be on same ballot or each language requires a separate ballot.)

Regardless of the number of languages utilized, instructions and ballot information provided to the voter can be displayed in each language. This data comes from the language information included in the data entry performed in the Capture module of Electionware. Multiple languages can be placed on a single ballot; nevertheless, ES&S urges caution when combining more than two languages on a ballot. The reason for this is due to the readability being significantly reduced for each additional language included on the ballot.

2.51 Describe type, size and weight of ballot stock required for tabulation by system and if stock is commercially available.

See Question 2.51 in Attachment 1, Features Questionnaire Responses, for information about the type, size, and weight of the ballot stock for the proposed DS850 tabulator.

2.52 Describe the process required to add write-in candidates to ballot.

See Question 2.52 in Attachment 1, Features Questionnaire Responses, for information about the process to add write-in candidates to the ballot.

2.53 Document any limitations related to number of contests, text length or number of pages for paper and/or accessible ballots and reports. Describe process for counting/auditing of multi-page paper ballot.

ES&S' election setup and tabulation software can handle the following:

- ***Maximum number of precincts: 9,999***
- ***Maximum number of contests: Not limited by the election setup and tabulation software. It is limited by the physical ballot: the number of candidates in the contests, the number of response positions required by these candidates, and the physical space required for the text of the contests and candidate using a font that meets presentation requirements***
- ***Maximum number of candidates: 200 per contest***
- ***Maximum number of political parties: 62***
- ***Maximum number of ballot styles: More than 26,000. There is no limit on the number of precincts per ballot style or ballot styles per precinct as long as the total number of ballot styles does not exceed 26,000 per election definition***

ElectionWare's Paper Ballot feature allows multiple ballot sheets or pages. To add another sheet, the user simply enters the Ballot Setup screen and selects "Add" in the Ballot Sheets section. Different instructions and precinct/ballot style identifiers can be displayed on each sheet and side of the sheet. Contests and referendum can flow naturally from one side and sheet to the next, or they can be set to a specific side and sheet.

On the DS850, the total for each sheet of a multi-page ballot is counted and displayed on the summary reports. For reporting purposes, the Election Reporting Manager (ERM) will provide a total of each first page to represent an accurate ballots-cast total. In a primary election, the first page is displayed in ERM reports to show the total ballots cast also by party.

Architecture and Design

2.54 Describe your proposed system, how it works together and how it will interface with Pinal County's Voter Registration System. If possible, include a diagram of your proposed architecture.

See Question 2.54 in Attachment 2, Technology Questionnaire Supplemental Responses, for a description of the proposed system and how it will interface with Pinal County's existing equipment. See Appendices D and E for diagrams of the proposed architecture based on the current solution, EVS 5000, (certified and available now) and the future solution, EVS 5200 (projected to be certified by EAC to VVSG 2005 in July 2014).

2.55 Provide a list of technological specifications that will need to be provided by Pinal County. This should take into account network bandwidth, servers (e.g. web, application, data, content management), user base and all recommended software.

See Questions 2.55 and 2.61 in Attachment 2, Technology Questionnaire Supplemental Responses, for a list of all technology required for the solution, including COTS hardware and software.

2.56 What user end-point devices are part of this solution? Describe which and how your application design supports a variety of end-user devices (desktop, laptop, mobile device/smartphone.)

The end-point devices supported in the EVS systems proposed are desktops and laptops. The DS850 tabulators can be connected to the EMS Network to transfer election data to the EMS Server.

2.57 Describe the data backup procedures including storage method options.

See Question 2.57 in Attachment 2, Technology Questionnaire Supplemental Responses, for a description of data backup procedures including storage method options.

2.58 Does the system have any "special" or nonstandard network requirements?

No. The proposed current (EVS 5000) and future (EVS 5200) systems are deployed either as stand-alone or closed-network using a COTS switch and COTS server. See Appendices D.2 and D.3 for a diagram of the certified configurations for our proposed solution.

2.59 Does the solution implement any proprietary and/or non-traditional system architecture that may be considered atypical to common industry standards and implementation?

No. The proposed current (EVS 5000) and future systems are implemented using standard COTS servers, desktop or laptop computers, and network switches.

2.60 What proprietary technology (hardware and software) is needed for this application?

The EVS 5.x systems are implemented using standard COTS servers, desktop or laptop computers, and network switches.

The following is the list of proprietary hardware:

- ***DS850 (EVS 5000 and EVS 5200)***
- ***AutoMARK (EVS 5000)***

The following is the list of proprietary software:

- ***Removable Media Service***
- ***Event Log Service (EVS 5000 and EVS 5200)***
- ***ElectionWare (EVS 5000 and EVS 5200)***
- ***VAT Preview (EVS 5000 and EVS 5200)***
- ***Election Reporting Manager (EVS 5000 and EVS 5200)***

2.61 Provide a Federal certification list of all application and operating system software and versions used and/or supported as well as the recommended software and versions for any components that will be deployed in or integrated with any Pinal County infrastructure or applications.

See Question 2.61 in Attachment 2, Technology Questionnaire Supplemental Responses, for a list of the certified application and operating system software and versions used and/or supported in the solution; as well as recommended software and versions for any components that will be deployed in or integrated with any Pinal County infrastructure or applications.

2.62 Describe any critical system background transactions (ie updates, refreshes etc) and their frequency / performance impact.

There is no critical background transactions on which the system relies. The EMS uses some windows services for logging and USB media formatting and their performance requirements are well within the capacity of the system configuration.

2.63 Describe any critical batch processes and their frequency / elapsed time (daily, monthly or annual batch window) constraints.

Ballot style generation, election-media data generation, and results loading are some of the batch activities in the election definition process performed on demand. The time to complete each task depends on the amount of data being processed.

The DS850 processes ballot data into batches. On request, the DS850 can aggregate this data into summary results. These results, along with the ballot Cast Vote Records (CVRs) and images can be exported to ElectionWare. These processes are done on demand. The time to complete each process depends on the amount of data that is packaged and transmitted.

2.64 What are your best practices (data collected and analyzed) to monitor for application load and stress testing?

Volume testing of ES&S hardware is conducted roughly every six months to confirm the system continues to operate well as volume increases. Regarding software, ES&S has standard test cases and elections that stress every field within the election management system. We also perform regular tests that require 25 individual users to access the same ElectionWare database and perform repeated, simultaneous actions.

Additionally, specific tests are run that test the limits of the system, addressing such areas as the maximum number of precincts and contests supported. Finally, the ES&S Quality Assurance Department performs integration testing multiple times per year that involves real-world election datasets from some of the largest jurisdictions in the country. These jurisdictions include, but are not limited to:

- ***New York City (NY)***
- ***Miami-Dade County (FL)***
- ***Cuyahoga County (OH)***
- ***Hennepin County (MN)***

2.65 Based on increased business use or peak demands, what parts of the application's technology infrastructure would need to change and how is that typically accomplished?

We do not foresee any change to the application technology infrastructure except for hard disk space. The specification for the server is to contain approximately two elections at any one time. If the County decides to keep older elections with ballot images on the system, there may be a need to augment the storage space on the server. Alternatively, the older elections can be backed up and archived, freeing space for new elections.

2.66 Describe the degree of fault tolerance for the system and any redundancies that are built into each component.

All components of the propose system are developed to allow execution only in the intended manner. If there are system or environmental issues recognized that would compromise the proper execution of the system, warnings, errors, or shutdowns may be issued as a protection.

The ElectionWare EMS server is configured with RAID storage to allow mirroring of data to recover from hard disk failure. The server is also powered by redundant power supplies to have uninterrupted operation even in case of the power unit failure.

The DS850 stores all data to the 1 terabyte (TB) hard disk drive. Backups of the results are completed by exporting the data to USB flash drives. Data exported is digitally encrypted and signed to prevent tampering with results.

Paper ballots and ballot summary cards (ExpressVote – EVS 5200 future system) serve as an additional redundancy.

Network Security

2.67 What are the system's network security requirements - placement in the network, ports/protocols used for communication through firewalls?

The Election Management System (EMS) network is designed around the concept of a closed-loop local-area network (LAN). In isolation, it would not be connected to the Internet or any other internal network. Optionally, the DS850 tabulators can be connected to the EMS network via an SFTP Server hosted on the EMS server. For more details, the reader should return to our response to Question 2.54 in Attachment 2, Technology Questionnaire Supplemental Responses.

2.68 Will you, the Responder, need access to Pinal County technology infrastructure to provide support for the proposed solution? If so, please document your typical approach for doing so and expectations from Pinal County in regards to mechanisms, access privileges, etc.

Not applicable for the proposed system.

2.69 Will Pinal County need to access any aspect of the solution not hosted at/on County infrastructure? If so, please document your typical approach for doing so and expectations from you, the vendor, in regards to mechanisms, access privileges, etc.

Not applicable for the proposed system.

Security

2.70 Describe details related to how security and access control management is implemented across the various aspects of the solution for internal and external security.

See Question 2.70 in Attachment 2, Technology Questionnaire Supplemental Responses, for details on how security and access control management is implemented across various aspects of the solution for internal and external security.

2.71 Describe your proven solutions for Identity Management and any necessary integrations to Pinal County's Identity Management solutions.

An individual non-administrator Windows user account is created for every authorized EMS user. In addition, an ElectionWare user account will be created allow the users to login to the ElectionWare server.

If the DS850s are networked, an SFTP user account with a strong system-generated password is created for each DS850. The DS850 would use this SFTP user account to transfer results to the SFTP server on the internal network.

2.72 Describe the system's authentication requirements, including ability to verify software Hash Code.

The SFTP user account passwords are exported to the SFTP server in an XML file and all the passwords are stored as SHA-256 hashes in the XML. The security access codes set up in ElectionWare are sent to the tabulators on a Qualification Media in the form of SHA-256 hashes.

2.73 Describe the mechanisms used for determining how authentication takes place across the various aspects of the system for internal and external security.

Internal Network

On the Election Management System (EMS) PC, a user is first authenticated by Windows. After a user is successfully logged in, the user must authenticate with the Postgres server through an ElectionWare user account (user ID and password). In addition, unique Windows share user IDs and passwords are required to access the shared folders containing election data.

DS850: Rather than individual user authentication, there are three different access codes that allow the user to perform various actions on the tabulator based on access levels.

AutoMARK: A locked compartment protects against unauthorized access to the flash memory card. Election officials at the poll site level will use a key to unlock the compartment, insert the flash memory card, and lock the compartment before opening the polls for voting. No further access to the compact flash card is necessary until the polls are closed, when it can be removed for safekeeping.

ExpressVote Universal Voting System (EVS 5200): A user's role (election official or voter) determines which screens are presented and can be navigated. A physical switch behind a locked door determines which role is active. The required election security code on the System Maintenance screen prevents unauthorized individuals from progressing beyond the Election Code entry screen. ExpressVote requires a password for executing functions such as loading of the election definitions and a system maintenance security code for access to critical areas of system configuration, such as upgrading firmware, and thus restricts access to these areas to authorized personnel.

2.74 Describe the mechanisms used for how authorization is implemented and takes place for accessing and performing solution processes and functions for internal and external security.

The following are the user roles available in ElectionWare:

- ***Ballot Reviewer: Can only view ballots in the Produce modules. This user cannot make any changes to the election data.***
- ***Media Creator: Can only create the various types of media for the DS850, AutoMARK, and ExpressVote. This user cannot modify the election definition.***
- ***Ballot Producer: Can only print ballot PDFs. This user cannot perform any other tasks.***
- ***User. Can create, delete and modify any information in the election.***
- ***Administrator: Can perform all functions of the User role along with creating, modifying and inactivating any users.***

The user is exposed to only the actions and function that are allowed that user. The rest of the modules and functions are hidden from the user. See our response to Question 2.70 for additional information.

The DS850 provides access codes that allow access for operator and administrative roles. Access code protection is configurable to protect all operations of the applications. Pass codes are required to access all critical functions, including Election Administration, Processing Modes, System and Hardware Maintenance, and Results functions. Supervisor functions are limited to the controls provided in the system menus.

ElectionWare provides three different types of access codes for the DS850:

- ***Election Access Code: Used to allow the user access to basic election functions like opening and closing and printing of reports.***
- ***Administrator Access Code: Used to allow the user access to system maintenance, settings and diagnostic functions of the tabulator.***
- ***Override Access Code: Used to all the user access to perform previleged functions like re-opening of polls or changing election settings for that election.***

Before any action could be performed on the DS850, the user is first authorized by the Election Access Code. Based on the action selected, the user may be prompted to enter a different access code.

2.75 Describe the mechanisms used to create and manage access and authorizations based on user roles and/or group for internal and external security.

The Windows user accounts and groups are created by the Windows User Management module.

Administrators use the ElectionWare Manage module to configure ElectionWare user accounts and passwords, enter initial jurisdiction settings and manage existing elections and election templates, including initial security setting for ElectionWare.

The DS850 access codes for operator and administrative roles are set up in the Configure module in ElectionWare.

The SFTP User accounts for the tabulators are automatically created by the system when an election media is created for that tabulator. The SFTP User accounts are exported to the SFTP server though an encrypted XML file which the election administrator would load on to the SFTP servers.

2.76 Describe the mechanisms used to ensure that the correct users, based on user role or group, are granted the correct privileges to the various components, client data views, workflows, processes, functions, and data of the solution for internal and external security.

It is the responsibility of the Election Administrator to assign the right privileges to the right user so that they can perform only the appropriate functions. See our answer to Question 2.74, above, for more information about how the system separates user privileges to various components by roles.

2.77 Describe the mechanisms used to configure and control which functions users are able to access, view, update, create and/or delete for internal and external security.

See our answer to Question 2.75, above, for details on the mechanisms used to create and manage authorizations based on user roles and/or group for internal and external security.

2.78 Describe the mechanisms used related to user I.D. and password management; include any details related to length, complexity, reuse, failed login attempts, lockout duration, and expiration for internal and external security.

ElectionWare requires users to enter a valid username and password before accessing the application. The user name and passwords are stored in an encrypted database. ElectionWare's strong password methodology requires the password be at least eight characters long and include at least one number, one uppercase letter, and one lowercase letter, and contain no spaces.

2.79 Describe how data is transported and the mechanism(s) used for moving data between client(s) and application / data server environments as well as any details related to the securing of the data transport.

The EMS applications and the database server are in a closed network in a physically secure location, so the communication between the EMS client application and the Postgres database server is not encrypted. The DS850, also on an inside network, communicates the results data to the SFTP Server on the EMS server using the SFTP protocol.

2.80 Describe any software security key that may be changed by Pinal County staff before each election.

ElectionWare enables Pinal County staff to change the election code, override code, qualification code, and administration code before each election for the DS850, AutoMARK (proposed solution), and ExpressVote (future solution).

Data

2.81 What are the standardized distributed data management services that are utilized (e.g. validation, consistency checks, data edits, encryption and transaction management) and where do they reside?

The election data is stored in the ACID-compliant Postgres database server. All the user actions in an election are encapsulated in transactions. The data entering the system either through the user interface or through imports in the client application goes through data validation and data

consistency checks in the election definition service layer within the application before it is sent to the database for storage.

The database table schema is also designed with integrity checks, such as uniqueness and foreign key referential integrity to ensure data integrity and consistency. The data transmitted to the SFTP server from the tabulator is a single package, which eliminates partial results transmission. The decryption and signature validation of the transferred data before it is accumulated further ensures data integrity.

2.82 What data, if any, from Pinal County or previous vendor will be needed to launch the solution? What extract, transfer, conversion, load methods have you found most successful to migrate to your application?

No data from a previous vendor is required. ElectionWare contains a flexible import wizard that accepts election data as delimited files. Every component of election data needed to create ballots can be imported via these files. Examples of data that can be imported include, but are not limited to, precincts, political districts, offices, candidate information, poll sites, and jurisdictional-specific data.

2.83 Describe the mechanisms used to archive the following:

- Software (e.g. versions, patches, customization)
- Configurations and Properties
- System Data (e.g. security, event, and transaction logs, backup files)
- Application Data (e.g. data, transactions, reports)

As a minimum, ES&S maintains escrows for all projects with Iron Mountain Intellectual Property Management, Inc. The following are included in each escrow:

- ***A copy of all program source code developed and used for our proprietary software and firmware.***
- ***Documentation that identifies the Commercial-Off-The-Shelf (COTS) toolset (operating systems, compilers, etc.) that must be acquired to create the executable software and firmware.***
- ***Documentation that describes the build procedure to follow when creating the executable software and firmware from the proprietary software and firmware.***
- ***A technical data package (TDP) that includes the relevant Functional Descriptions, Hardware and Software Designs, and User Guides.***

For federal (Election Assistance Commission [EAC]) certified projects, each escrow will also include the following:

- ***A copy of all proprietary software and firmware as created using the program source code, COTS, and build procedure from above.***
- ***Hard drive images captured as part of the build procedure.***
  - ***Build Environment – COTS tool-set only***
  - ***Loaded Source Code – Build Environment with program source code added***
  - ***Created Executables – Loaded Source Code and the created proprietary software and firmware***

Should ES&S cease operations and become unable to maintain and support our proprietary software and firmware while under an obligation to do so, the jurisdictions who have entered into agreements with ES&S shall have the right to obtain the source code to the extent necessary to enable the jurisdictions to use ES&S' proprietary software and firmware in accordance with the terms of the final contract.

Pinal County is responsible to archive all election and vote data so that it can be retrieved and restored when necessary.

All the components of the current and future systems will be installed under the control of Pinal County itself.

- ***Software: The system installation disks themselves act as archives for the software.***
- ***Configuration and Properties: After the system is fully installed, an image of the hard disk can be created and archived off for future restores.***
- ***System Data and Application Data: ElectionWare has a built-in capability to do a backup of all election-related data, including security and event logs, into one archival package. When the archive is created, the user supplies a password which would be used during the restore process to verify the integrity of the archive. Alternatively, the server can be imaged after the election is completed and archived. Backups of the DS850 results are completed by exporting the data to USB flash drives.***

2.84 Describe any mechanisms related to ability to inquire and retrieve archived information and details:

- Software (e.g. versions, patches, customization)

- Configurations and Properties

- System Data (e.g. security, event, and transaction logs, backup files)

- Application Data (e.g. data, transactions, reports)

All the data are on machines within Pinal County's facilities. It is the responsibility of Pinal County for the safekeeping of the archived artifacts so they can be retrieved and restored when needed. See our response to Question 2.83, above, for information about retrieving ES&S projects from escrow.

2.85 Describe the length of time each of the following are a) typically retained and b) could be retained:

- Software (e.g. versions, patches, customization)

- Configurations and Properties

- System Data (e.g. security, event, and transaction logs, backup files)

- Application Data (e.g. data, transactions, reports)

The database backups and system images can be archived for as long as it is required by Pinal County. All the data are on machines within Pinal County's facilities.

See our response to Question 2.83, above, for information about retrieving ES&S projects from escrow.

2.86 For any data not stored by or at Pinal County, describe the process(es) and mechanisms used to migrate off the proposed solution - Exit Strategy - Return data and data relationships to Pinal County, destruction/removal/safeguarding of data.

All data will be stored by or at Pinal County.

2.87 Describe data export options of ballot files for use with both electronic poll books and commercial printers.

ElectionWare produces .PDF files for export to electronic poll books and to your commercial printer for ballot printing.

2.88 Describe data import options of precincts from current Voter Registration database.

ElectionWare can accept data from your current voter registration database, ES&S PowerProfile v12.4. This import includes robust data validation and detailed indications at the import file line level for any potential data issue.

Level of Service

2.89 Describe your approach related to deploying the application components for a) business continuity and b) disaster recovery in general and in particular related to site loss.

Refer to Question 2.89 in Attachment 2, Technology Questionnaire Supplemental Responses, for information on business continuity and disaster recovery.

2.90 Describe your typical server resiliency approaches to provide best customer application availability (e.g. Active-Active servers, Active-Passive servers, clustering, load balancers).

The database server has redundant hot swappable power supply. The storage in the server is configured on a RAID 10 to allow for higher performance and redundancy. The EMS server and database server can be set up for high availability. Postgres supports options like master-slave failover using synchronous/asynchronous streaming replication. These options are not configured by default in the certified configuration, but can be set up with additional servers.

2.91 Describe approach and supporting technical and process details related to software, configuration, and data backup and recovery procedures.

Approach and supporting technical and process details related to software, configuration, and data backup and recovery procedures are found in the ES&S EVS 5000 Systems Overview document at Appendix F.

Support

2.92 Describe your proven solutions for maintenance of the application and options for Service Level Agreements.

Refer to Question 2.92 in Attachment 2, Technology Questionnaire Supplemental Responses, for a description of our options for maintenance of the hardware and software found in our solution.

2.93 Provide overall critical success factors for Pinal County's technology staff to ensure deployment success. What skills/tools/support does Pinal County need?

See Question 2.93 in Attachment 2, Technology Questionnaire Supplemental Responses, for overall critical success factors for Pinal County's technology staff to ensure deployment success.

2.94 What is your release management strategy (e.g. frequency of versions and releases, cost for upgrades, skip versions/releases)?

ES&S uses a modified Agile software development lifecycle for each release where initial planning and design are more defined and intensive than that used in traditional Agile; development iterations closely adhere to Agile practices; and fall through iterations are expanded to incorporate certification activities.

Planning for the frequency and content of future releases will incorporate client input as ES&S values the input provided by our customers. Installation of ES&S systems can typically be managed by client IT departments or specialists, or by election office personnel. System changes are normally backward- compatible in that the changed system is able to utilize the outputs of the previous system.

The operational test cases and the regression test-beds that we maintain in our quality assurance processes for every release, along with our strict change management processes, ensure previously applied patches are carried forward. Individual components of a release can be managed independently, dependent on the needs of the client. This software release flexibility is a result of using Agile for the development lifecycle and through the long-term election experience of ES&S' development teams.

ES&S continually upgrades and scales our systems and products to conform to both federal guidelines and state law requirements. Throughout the years, our scalable technology has allowed ES&S to build and adapt systems to conform to and be federally certified to meet the increasing technology demands of the 1990 FEC, 2002 NASED, and 2005 EAC Voluntary Voting System Guidelines, while also meeting the demands of state certification requirements.

When federal guidelines and state law changes require new releases of our products, ES&S works with our customer base to develop federal and state certification timelines and upgrade strategies to ensure that the upgrades occur around the election calendars of the jurisdictions.

2.95 Describe your software compatibility and how it aligns to the software release cycles of the major software vendors such as Microsoft, Oracle and IBM, etc.

ES&S strives to remain current with all COTS (Commercial Off the Shelf) products used within the certified ES&S systems. Updates to COTS product versions are part of the ES&S release planning strategy and are reviewed for continued support by the COTS providers during the ES&S release planning activities. Once approved by the appropriate certification authorities, the COTS products used within the ES&S systems may be upgraded to the newer versions.

2.96 Are there significant version or release changes imminent that we should consider now during our first year of use?

ES&S recommends that Pinal County transition from proposed EVS 5000 to EVS 5200 after the EVS 5200 system is certified, which is projected to be Summer of 2014, in order to take advantage of the ExpressVote Universal Voting System. ExpressVote is an ADA-compliant device that provides a paper trail without the need for pre-printed ballots.

As you have noted throughout our proposal, we have provided you supplementary information on the capabilities of EVS 5200, when appropriate.

2.97 Please describe and outline the Roles and Responsibilities to be provided by you, the Responder, and the expectations for Pinal County as it relates to problems, incidents, knowledge, patching, endpoint protection, testing, and general support. Is there an expectation that you, the Responder, or Pinal County have and/or use specific solution(s)?

Pinal County will be responsible for testing the functionality and accuracy of any election the County creates with ElectionWare. This would include election pre-testing of equipment and Logic & Accuracy testing of the election-specific election definition.

As long as the County maintains a hardware and software maintenance and support agreement with ES&S, the County will have access to ES&S help desk support for any hardware or software issue resolution. ES&S' help desk will track reported problems and provide and track solutions. The ES&S help desk will work through reported issues until they are resolved to Pinal County's satisfaction.

Testing and Verification

2.98 Describe your load (performance) and stress (extended time) test methods to help ensure we will not have production problems.

As an integral part of our certification testing process, ES&S has a dedicated team of Quality Assurance specialists whose primary responsibility is to conduct stress, volume, and regression testing for all hardware and software components of the system that will be certified by the VSTL, EAC, and the State certification bodies. The rigorous testing methodology allows us to completely test each new release from end-to-end before it is reviewed by the Federal testing authorities. The testing plans are built to thoroughly stress each component to validate that the entire system meets or exceeds the VVSG requirements mandated by the EAC. By the time a certified release is approved by the Federal and State authorities, you can be assured that the production hardware and software components of the system will work exactly as advertised. Below are a series to the tests that ES&S conducts to ensure you will not have production problems:

Load Testing: System load testing included 25 individual users creating media and viewing ballots simultaneously. There was no noticeable change in performance. This load test was conducted using an election that featured over a million ballots. There was no observable degradation in performance.

***Limits Testing**: A set of six different elections were used to test the system end-to-end as part of the system integration tests. The following are the limits to which the system was successfully tested.*

- ***Maximum Precincts in an Election= 9,900***
- ***Maximum ballot styles in an election = 9,900***
- ***Maximum candidates\counters in an election = 21,000***
- ***Maximum contests allowed in an election = 21,000***
- ***Maximum candidate\counters allowed per precinct = 1,000***
- ***Maximum contests allowed per ballot style = 200***
- ***Maximum candidates (ballot choices) per contest = 175***
- ***Maximum count for any precinct element = 500,000 (65,500 limit from each tabulators media)***
- ***Maximum number of parties = General is 75, Primary is 20***
- ***Maximum "vote for" per contest = 98***
- ***Ballot formats = All ballots must be the same size***
- ***Maximum district types = 20***
- ***Maximum district of a given type = 40***

***Volume Testing**: ES&S hardware is volume tested on a regular basis by the ES&S Quality Assurance Department (QA). ES&S strives to replicate real-world usage of the system when performing volume testing. QA personnel pay close attention to details such as system speed, consumables used, and maintenance required.*

2.99 Describe what tools or processes have been used to test the system for memory leaks, reliability and general robustness.

During the development process, the Quality Assurance Department (QA) uses an automated test tool to monitor system performance on a weekly basis. The tool ES&S has chosen to employ is Hewlett-Packard's Unified Functional Testing (UFT), which is widely recognized as one of the most robust and feature-rich utilities on the market today.

QA receives regular builds of software for evaluation from the development staff. With each new build, UFT runs an extensive series of automated tests to confirm stability and conformance to expected results. During its operation UFT builds a series of 22 election datasets, each designed to test specific functionality or stress the system in some way. The end result of the utility's work is a series of elections built exactly the same way every time a new build of software is received. Reports are automatically generated detailing every step in the process and whether the software performed as expected.

This standardized method of testing enables ES&S QA personnel are able to rapidly confirm that a new build of the election software maintains the basic reliability of its predecessors. UFT is provided rough estimates of how long each step in the process should take, and immediately notifies the system administrator if a particular process is extending past its expected duration. Once a particular process is flagged, QA and development personnel can direct their attention toward this specific area of functionality and determine if corrective actions need to be taken.

2.100 Describe any stress testing to hardware as it applies to storage and transportation.

As a part of VVSG, Volume 1, Section 4.2.1.14, stress testing to the components of EVS 5000 is required to meet the following "Environmental Control – Transit and Storage Equipment used for vote casting or for counting votes, shall meet these specific minimum performance standards that simulate exposure to physical shock and vibration associated with handling and transportation by surface and air common carriers, and to temperature conditions associated with delivery and storage in an uncontrolled warehouse environment:

- ***High and low storage temperatures ranging from -4 to +140 degrees Fahrenheit, equivalent to MIL-STD-810D, Methods 501.2 and 502.2, Procedure I-Storage;***
- ***Vibration equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier***

- ***Uncontrolled humidity equivalent to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid***

2.101 Please describe any additional features or functionality not referenced above.

ES&S does not have additional features of our products to discuss in this section.

3 Cost

Responder shall complete Response Form 3 Pricing Sheet RFP PC-131219 Elections Equipment & Maintenance. Any response that does not include this completed Pricing Sheet or includes an incomplete Pricing Sheet may cause the entire offer to be deemed unacceptable and therefore non-responsive.

4 Conformance to Terms and Conditions and Scope of Services

Response Form Responses

_____*Election Systems & Software, LLC*_____ have read, understand, and shall comply with all Terms and Conditions. Responders that accept the County's Terms and Conditions shall check **YES** to clearly indicate their acceptance. Responders who take exception to the County's Terms and Conditions shall check **NO** and clearly indicate their exception(s) and provide Responder's suggested language.

_____**YES**, I acknowledge that I have read and understand all Terms and Conditions and will comply in any resultant contract.

✔ **NO**, I acknowledge that I have read, understand all Terms and Conditions and will comply in any resultant contract with the exceptions listed below.

Exceptions (If checked NO)

Responders that take exception to any Terms and Conditions shall justify their exception as well as proposing any changes to the County's language with the Responder's suggested changes clearly indicated. Additional pages may be added so long as they are clearly referenced in the spaces provided. **Please note that taking exception to any Terms and Conditions will affect your evaluation score.** Both the number of exceptions and the severity of the exceptions can affect your score and may have you deemed non-responsive for this solicitation.

Cite the specific Term and Condition for which an exception is taken: ***See Appendix J***

Responder's justification for the exception: ***See Appendix J***

Responder's suggested changes: ***See Appendix J***

_____*Election Systems & Software, LLC*_____ have read, understand, and shall comply with the Scope of Services. Responders that accept the Scope of Services shall check **YES** to clearly indicate their acceptance. Responders who take exception to any item in the Scope of Services shall likewise check **NO** and clearly indicate their exception and provide Responder's suggested language.

✔ _____**YES**, I acknowledge that I have read and understand the Scope of Services and will comply in any resultant contract.

_____**NO**, I acknowledge that I have read, understand the Scope of Services and will comply in any resultant contract with the exceptions listed below.

Cite the specific item in the Scope of Service for which an exception is taken: ***N/A***

Responder's justification for the exception: ***N/A***

Responder's suggested changes: ***N/A***

End of Response Form 1 for RFP PC-131219 Elections Equipment & Maintenance

Response Form 2

Hardware

Please answer all questions. If a question is not relevant or applicable, indicate so in the comments. Comments may be provided on a separate attachment, but must include the Question and Number and be in the same order as this form. Notation must be made in each question space on this form referencing any attachment.

Please indicate if the proposed solution details are the current version configuration or included in a planned future version. If there is any solution customization being proposed please elaborate in your comments.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
System					
2.1.1.1	Certified by VSTL to VVSG. Document Voting System Name and Version, and to which Version VVSG the system is certified.	Mandatory	Yes	Yes	ES&S EVS 5000 was certified to 2005 VVSG on May 16, 2013. See **Appendix G.1** for the EAC-certified-VSTL Wyle Labs' Final Test Report, and **Appendix G.2**, for the EAC Certificate of Conformance. A diagram of the proposed certified system, EVS 5000, is located at **Appendix D.1 -D.3**. A diagram for a future system (EVS 5200), containing enhanced hardware and software, is located at **Appendix E**.
2.1.1.2	Certified by Arizona SOS to meet Arizona Election Laws by April 21, 2014.	Mandatory	Yes	Yes	The Arizona SOS certified the ES&S EVS 5000 Voting System on June 17, 2013. See **Appendix C** for the EVS 5000 State of Arizona certification notice.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.1.1.3	EMS is a stand alone system, not connected to an external network, a public system, or the internet at any time. The EMS and components of the system may only be attached to other components inside of an isolated network.	Mandatory	Yes	Yes	The EMS is a stand-alone system that is not connected to an external network, a public system, or the Internet at any time. As described in SOW # 2.1.1.3 in **Attachment 3, Hardware Questionnaire Supplemental Responses**, its possible configurations are stand-alone or closed local network, which may be peer-to-peer or multi-user client/server. See **Appendices D.2 and D.3** for diagrams of such closed local network systems for the proposed system (EVS 5000). This functionality is included in the current EVS 5000 configuration.
2.1.1.4	Wireless communications devices are not used on any voting equipment, vote tabulation computers, or any network that attaches vote tabulation equipment or computers.	Mandatory	Yes	Yes	Wireless functionality is not included in the proposed EVS 5000 configuration. In addition, wireless functionality is not included in the future system (EVS 5200).
2.1.1.5	Full implementation and acceptance testing of proposed solution, including Federal and State certification, possible by May 19, 2014.	Mandatory	Yes	Yes	See **Preliminary Project Plan and Implementation Schedule** in **Appendix H** for a detailed implementation plan for Pinal County that provides for full implementation of EVS 5000, including delivery of hardware and sufficient time to complete acceptance testing, by May 19, 2014.
Central Count					

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.2.1.1	Audit log of all actions taken on device is kept and accessible for printing.	Mandatory	Yes	Yes	The DS850 contains an audit log of all actions taken on the device, which may be printed continuously and is stored in the internal hard drive. See SOW # 2.2.1.1 in **Attachment 3, Hardware Questionnaire Supplemental Responses** for more details. This functionality is included in the current EVS 5000 configuration.
2.2.1.2	Can read ballots from all precincts in election without exchanging media.	Mandatory	Yes	Yes	The DS850 is capable of reading all ballots in an election without exchanging media. This functionality is included in the current EVS 5000 configuration. This functionality is included in the current EVS 5000 configuration.
2.2.2.1	Capable of counting non-oriented ballots.	Preferred	Yes	Yes	The DS850 is capable of scanning and tabulating ballots in all four orientations. In addition, the DS850 is capable of scanning ballots with different orientations (the front side is portrait and the back side is landscape). This functionality is included in the current EVS 5000 configuration.
2.2.2.2	Can produce reports including number of ballots cast or read into each precinct without closing the polls or revealing any preliminary results data.	Preferred	Yes	Yes	As a central tabulator, the DS850 does not utilize an open/close polls concept, but rather stores all ballot data until the jurisdiction allows the generation and export of results via paper report or media. The DS850 Precincts Process Report, which includes number of ballots cast or read, can be generated at any time during the election. It does not include any vote totals; however, the Results Report does. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.2.2.3	System tolerates folded ballots at the same speed as flat ballots.	Preferred	Yes	Yes	The DS850 operates at one speed and pick rate for folded and unfolded ballots. With appropriate ballot preparation, ballot throughput results approach that of flat ballots. See SOW # 2.2.2.3 in **Attachment 3, Hardware Questionnaire Supplemental Responses**, for information on the DS850's innovative design. This functionality is included in the current EVS 5000 configuration.
2.2.2.4	System is capable of detecting, alerting and sorting ballots issued on the wrong style for the election being processed without tabulating ballot.	Preferred	Yes	Yes	Invalid ballots are one of the outstack criteria. They will be sorted into one of the bins sorted to receive uncounted ballots and will be designated as "invalid ID" in the appropriate bin report. This functionality is included in the current EVS 5000 configuration.
2.2.2.5	Capable of sorting or out-stacking ballots with write-in votes.	Preferred	Yes	Yes	Yes, the DS850 can out-stack write-in ballots into a designated write-in bin. The DS850 has an option to specify whether ballots with write-ins are to be processed and/or sorted. See SOW # 2.2.2.5 in **Attachment 3, Hardware Questionnaire Supplemental Responses** for more information. This functionality is included in the current EVS 5000 configuration.
2.2.2.6	Capable of sorting or out-stacking ballots with overvotes.	Preferred	Yes	Yes	Yes, ballots with contests containing over-votes can be sorted/out-stacked into the ballot-not-processed bin or sorted into the ballot-processed bin. See SOW # 2.2.2.6 in **Attachment 3, Hardware Questionnaire Supplemental Responses** for details. This functionality is included in the current EVS 5000 configuration

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.2.2.7	Capable of sorting or out-stacking blank voted ballots.	Preferred	Yes	Yes	The DS850 is capable of sorting or out-stacking blank voted ballots. This functionality is included in the current EVS 5000 configuration
2.2.2.8	System supports saving ballot data from multiple central count machines to a single piece of memory media.	Preferred	Yes	Yes	The system allows multiple DS850s to be connected via a closed, secure network to an EMS Server that collects all Cast Vote Records, images, and results data to a single location for reporting server access and image reviewing. This functionality is included in the current EVS 5000 configuration.
2.2.2.9	Capable of printing a unique ballot identifier on individual ballots as they are tallied.	Preferred	Yes	No	The DS850 hardware supports the use of an optional ballot imprinter which is capable of printing a unique identifier each time the ballot is scanned to give a visual indicator that the ballot has been previously scanned. Counted ballots have this unique number embedded in the file names of the image and CVR files to further facilitate ballot review and the correlation of paper ballots to ballot images. The imprinter has not been certified, but could be added to the certification of a future version upon request by a customer.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
Accessible Voting Equipment for individuals with disabilities					
2.3.1.1	System shall be accessible for individuals with disabilities, including nonvisual accessibility for the blind and visually impaired, in a manner that provides the same opportunity for access and participation (including privacy and independence) as for other voters.	Mandatory	Yes	Yes	Both the ES&S AutoMARK® (current system) and ExpressVote® (future system) are accessible for individuals with disabilities, including non-visual accessibility for the blind and visually impaired, in a manner that provides the same opportunity for access and participation (including privacy and independence) as for other voters. See SOW # 2.3.1.1 in **Attachment 3, Hardware Questionnaire Supplemental Responses** for details. This functionality is included in the current EVS 5000 configuration.
2.3.1.2	Multi-language support.	Mandatory	Yes	Yes	Both the ES&S AutoMARK (current system) and ExpressVote (future system) contain robust on-screen ballot and audio support for multiple languages to assist voters who are more comfortable reading or hearing ballot contents in an alternative language. This functionality is included in the current EVS 5000 configuration.
2.3.1.3	The units must be interchangeable, and able to be used for both early voting and Election Day.	Mandatory	Yes	Yes	All AutoMARK units are interchangeable (all ballot information is contained on a single flash memory card) and all ExpressVote units are interchangeable (election information, including ballot styles, is contained on a USB flash drive). Both AutoMARK (current system) and ExpressVote (future system) were designed to be used for both early voting and on Election Day. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.3.1.4	Units can be outfitted with tamper evident security seals and/or locks.	Mandatory	Yes	Yes	Both the AutoMARK (current system) and ExpressVote (future system) can be outfitted with tamper-evident security seals and/or locks. See SOW # 2.3.1.4 in **Attachment 3, Hardware Questionnaire Supplemental Responses** for details. This functionality is included in the current EVS 5000 configuration.
2.3.2.1	Ability to use various accessibility tools such as A/B paddle, sip-and-puff, etc.	Preferred	Yes	Yes	Both AutoMARK (current system) and ExpressVote (future system) provide the ability to use various accessibility tools, including Braille keypad; audio instructions with user-controlled speed, tone, and volume options; screen display with zoom and high-contrast options; and AT devices including sip-'n'-puff, A/B paddle, foot pedal, or other two-way switch. This functionality is included in the current EVS 5000 configuration.
2.3.2.2	Easily transportable without damage to internal circuitry.	Preferred	Yes	Yes	Both the AutoMARK (current system) and ExpressVote (future system) are easily transportable without damage to internal security. See SOW # 2.3.2.2 in **Attachment 3, Hardware Questionnaire Supplemental Responses** for details. This functionality is included in the current EVS 5000 configuration

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.3.2.3	Devices should withstand frequent loading and unloading, stacking, assembling, disassembling, reassembling, and heavy use, without damage to internal circuitry.	Preferred	Yes	Yes	Both the AutoMARK (current system) and ExpressVote (future system) can withstand frequent loading and unloading, stacking, assembling, disassembling, reassembling, and heavy use, without damage to internal circuitry for details. See SOW # 2.3.2.2 in **Attachment 3, Hardware Questionnaire Supplemental Responses** for details. This functionality is included in the current EVS 5000 configuration.
2.3.2.4	Battery backup solution, either internal or external, capable of maintaining uninterrupted usage and preservation of election data during a power failure, or when power is disengaged or interrupted from the unit. This battery back-up device should be able to fully operate the unit for at least 4 hours.	Preferred	Yes	Yes	If external power is lost, both the AutoMARK (current system) and ExpressVote (future system) seamlessly revert to a backup battery that provides sufficient capacity to allow normal operation for at least four hours. The internal battery backup has been thoroughly tested to meet and exceed the VVSG requirement of a minimum of two hours battery operation in case of power loss. This functionality is included in the current EVS 5000 configuration.
2.3.2.5	Visible low battery indicator.	Preferred	Yes	Yes	Both the AutoMARK and ExpressVote have visible LED lights indicating use of external power or battery. An alert message appears onscreen and over audio if the battery level becomes low, in which case the units will allow the voter to complete the voting session. The units also alert the user if the battery level becomes very low and prevent the start of a new voting session. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.3.2.6	Units are configured for efficient storage when not in use.	Preferred	Yes	Yes	As configured for transport and storage, the AutoMARK (current system) is (WxDxH) 20.8"x26.0"x7.5". It can be safely stacked up to five units high. As configured for transport and storage, the ExpressVote (future system) is (WxDxH) 22.5"x17"x11". It can be safely stacked up to eight units high. The ExpressVote booth is collapsible and can stack up to eight units high. This functionality is included in the current EVS 5000 configuration.
2.3.2.7	All locks keyed the same with a key unique to Pinal County and not provided to all purchasers.	Preferred	No	No	By default, AutoMARK and ExpressVote units are shipped keyed alike. ES&S can customize the AutoMARK and ExpressVote units with unique keys for your jurisdiction. This will require the key lock assembly to be retrofitted at an additional cost determined at pricing and agreed upon by both Pinal County and ES&S.
2.3.2.8	Internal capability to perform self-diagnostic that specifically identifies any malfunctions with user friendly messages.	Preferred	Yes	Yes	The AutoMARK (current system) and ExpressVote (future system) units perform self-diagnostic tests of all system functions and components when the system is activated. Messages on-screen or in audio appear in "plain language" to ensure they are user-friendly and clearly state the action to be performed if response is required. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.3.2.9	Easy to set up and take down, with minimal or no technical assistance.	Preferred	Yes	Yes	Both the AutoMARK and ExpressVote can be unpacked and prepared for voting in minutes. Election workers simply remove the system from its storage/transport case, place the unit on a standard table or optional ES&S AutoMARK or ExpressVote table, plug the unit into a standard three-prong AC outlet, and turn the unit on. Alternative configurations for the ExpressVote, which include setting up the ExpressVote table with an attached card bin or setting up the ExpressVote voting booth, would each take additional minutes. All tasks can be accomplished without technical assistance. The steps to take down the AutoMARK and ExpressVote are similarly simple and fast. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.3.2.10	Units are of current technology and parts and consumables are readily available from more than one source.	Preferred	Yes	Yes	To ensure the sustainability of our products throughout its lifecycle and beyond, ES&S engineers its voting system products with an eye on durability, ease of maintenance, and availability of parts and supplies. The ES&S supply chain is the most extensive in the election industry. We have the largest product offering, so we must have a strong supply chain. Product sustainably and lead-time compression is the driving force to having a strong supply chain. We do our best to choose long life industrial grade components and hardware to insure we meet and exceed parts availability. We have complete bill of materials for all of our product lines. We continually monitor our component inventory supply, customer demand, and supplier availability. ES&S involvement includes inventory management, hardware engineering, manufacturing, purchasing, and field services. onstant monitoring and effective communications between all manufacturing partners is the main reason why we continue to enjoy success.
2.3.2.11	Charging of multiple units using a single electrical outlet.	Preferred	Yes	Yes	While this is not a certified configuration requirement, approximately seven AutoMARK devices can share a 20-amp circuit and approximately seven ExpressVotes can share a 20-amp circuit.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.3.2.12	Lightweight, with the unit weighing less than 20 lbs.	Preferred	Yes	Yes	The ExpressVote (future system) weighs less than 20 pounds, including internal battery. The AutoMARK (current system) weighs 48 pounds with battery and does not meet your preferred requirement.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
Servers and Workstation					
2.4.1.1	Servers - Tower sytle with at least one terabyte of storage capability. Must be compatible with the latest version of Windows Server (include keyboard, monitor, mouse, speakers)	Mandatory	Yes	Yes	The EVS 5000 voting system supports the following system configurations: • Standalone system: Microsoft Windows 7-based PC setup for full election support. Each computer configuration is a single, stand-alone, EMS workstation used for election preparation and reporting. • Windows Server EMS Network: Networked system that combines a Client/Server (Microsoft Windows 2008 Server) setup to support one or more client EMS Workstations with an optional results network for DS850 central ballot scanners. **Optional Windows Server EMS Network** The EMS network is the base of the proposed technology architecture. The EMS network is designed around the concept of a closed-loop local-area network (LAN). In isolation, it would not be connected to the Internet or any other internal network. The EMS system includes a Windows 2008 R2 server and Windows 7 Professional workstations. The workstations can be either desktop (tower style) or laptop computers. The workstations are then connected to the server using a gigabit switch. The DS850s can be connected to the EMS network via an SFTP Server hosted on the EMS Server. Each DS850 is given a unique User ID and Password. The SFTP Server is set up so that the DS850-transmitted data is stored directly into the proper election data folder on the EMS Server. All physical connections to the network are standard, physical, network connections.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
2.4.1.2	Workstation - remote access to EMS servers (keybard, monitor, mouse, speakers, printer)	Mandatory	Yes	Yes	The EMS system includes a Windows 2008 R2 server and Windows 7 Professional workstations. The workstations can be either desktop or laptop computers. The workstations are then connected to the server using a gigabit switch. See our response in **SOW #2.4.1.1**, above, or a more detailed response in Question 2.54, at **Attachment 2, Technology Questionnaire Supplemental Responses.**
2.4.1.3	Connectivity - Capable of networking with the central count units	Mandatory	Yes	Yes	The DS850s can be connected to the EMS network via an SFTP Server hosted on the EMS Server. Each DS850 is given a unique User ID and Password. The SFTP Server is set up so that the DS850-transmitted data is stored directly into the proper election data folder on the EMS Server. All physical connections to the network are standard, physical, network connections. Multiple DS850 tabulators can also optionally be networked to a central reporting PC for high-speed mass ballot counting and results consolidation. This local reporting network has no connections to the Internet or outside data lines.
2.4.1.4	Compatable with EMS software	Mandatory	Yes	Yes	The DS850 is compatible with the EMS software. The DS850s can be connected to the EMS network via an SFTP Server hosted on the EMS Server. Each DS850 is given a unique User ID and Password. The SFTP Server is set up so that the DS850-transmitted data is stored directly into the proper election data folder on the EMS Server.

Software

Please answer all questions. If a question is not relevant or applicable, indicate so in the comments. Comments may be provided on a separate attachment, but must include the Question and Number and be in the same order as this form. Notation must be made in each question space on this form referencing any attachment.

Please indicate if the proposed solution details are the current version configuration or included in a planned future version. If there is any solution customization being proposed please elaborate in your comments.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
Software					
3.1.1.1	Certified by VSTL to VVSG. Document to which version VVSG the system is certified.	Mandatory	Yes	Yes	ES&S EVS 5000 was certified to 2005 VVSG on May 16, 2013. See **Appendix G.1** for the EAC-certified-VSTL Wyle Labs' Final Test Report and, **Appendix G.2**, for the EAC Certificate of Conformance. This functionality is included in the current EVS 5000 configuration.
3.1.1.2	Certified by Arizona SOS to meet Arizona Election Laws by April 21, 2014.	Mandatory			The Arizona SOS certified the ES&S EVS 5000 Voting System on June 17, 2013. See **Appendix C** for the EVS 5000 State of Arizona certification notice. This functionality is included in the current EVS 5000 configuration.
3.1.1.3	Full implementation and acceptance testing of proposed solution, including Federal and State certification, must be possible by May 19, 2014	Mandatory	Yes	Yes	See **Preliminary Project Plan and Implementation Schedule** in **Appendix H** for a detailed implementation plan for Pinal County that provides for full implementation of EVS 5000, including delivery of hardware and sufficient time to complete acceptance testing by May 19, 2014. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.1.1.4	Ability to affirm Hash Code with National Institute of Science and Technology (NIST) Software Library, or with the Arizona Secretary of State's Office.	Mandatory	Yes	Yes	Hash codes can be affirmed with the Arizona Secretary of State's Office in accordance with Arizona's HASH verification procedure. This functionality is included in the current EVS 5000 configuration.
3.1.1.5	EMS requires a user to logon with a password at the operating system level.	Mandatory	Yes	Yes	The ElectionWare EMS requires a valid username and password to access the application. The strong password must contain at least eight characters with at least one number, one uppercase letter, and one lowercase letter, and it must not contain spaces. Access to the shared folder on the server requires a separate username and password. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.1.1.6	EMS has multiple levels of user access controlled by user accounts/passwords.	Mandatory	Yes	Yes	The system administrator creates unique user IDs for each user allowed to log onto Election Management System (EMS) workstations. Election personnel allowed access to the shared folder on the server receive a second unique share user ID and password. Users are assigned to user groups on the Windows server and workstations based on roles: • ElectAdmin – Election administrators • ElectDefine – Election personnel responsible for coding the elections • ElectResult – Election personnel responsible for election results processing • Shares – Election personnel allowed to access the shared folder on the server • Shutdown – Election administrators allowed to shut down the system Depending on a user's access rights, ElectionWare limits selections in the Manage module. Unavailable menu selections do not appear in the application interface. This functionality is included in the current EVS 5000 configuration.
3.1.1.7	Elections are Pinal County programmable from initial election definition to printer-ready ballots and ready-to-use ballot counter media without vendor intervention.	Mandatory	Yes	Yes	The proposed system is designed to enable Pinal County to handle all aspects of creating and managing an election without ES&S intervention. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.1.1.8	Capable of managing counter groups that can be assigned to precincts in a many-to-one relationship, including for each precinct, an election day group, an absentee group, and a provisional group.	Mandatory	Yes	Yes	Every precinct is automatically included and available for each of the counter groups. The ERM reporting software can accommodate up to 14 groups, with each precinct included. This functionality is included in the current EVS 5000 configuration.
3.1.1.9	Software provides multi-language support for ballot creation.	Mandatory	Yes	Yes	ElectionWare provides support for multiple languages, including English, Spanish, Chinese, Korean, Russian, Japanese, Vietnamese, Tagalog, and Creole. Multiple languages can be used to produce visual ballots (both paper and onscreen) and audio for AutoMARK ballots. Contained in current EVS 5000 configuration.
3.1.1.10	Programmable election types compatible with all system hardware include all those necessary for the State of Arizona including the multi-party open primary combined with nonpartisan primary ballot.	Mandatory	Yes	Yes	ElectionWare can be programmed for election types necessary for the State of Arizona, including multi-party open primary combined with nonpartisan primary ballot. ElectionWare enables the user to create various types of elections, including open primaries, nonpartisan, and general/special elections. This functionality is included in the current EVS 5000 configuration.
3.1.1.11	Software provides for rotation of candidate names on ballot to be turned on or off in accordance with Arizona State Law.	Mandatory	Yes	Yes	ElectionWare provides for the rotation of candidate names on the ballot to be turned on or off in accordance with Arizona State Law. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.1.1.12	System can produce necessary text file for upload to the State's Election Night Reporting system.	Mandatory	Yes	Yes	The proposed system is capable of exporting the necessary text files that could be used in conjunction with Arizona's Election Night Reporting system. This functionality is included in the current EVS 5000 configuration.
3.1.1.13	Generates exportable backup file for offsite storage.	Mandatory	Yes	Yes	ElectionWare enables the user to back up the entire election database for archiving in offsite storage. This functionality is included in the current EVS 5000 configuration.
3.1.1.14	System provides a secure method that will prevent a voter from voting twice.	Mandatory	Yes	Yes	With the proposed changes to the central count voting methodology proposed by the County duplicate voting would need to be managed through the County's voter management process at the polling locations (current paper poll register or acquisition of an electronic poll book system) or through the County's current Vote-by-Mail validation process. Other vendor solutions that utilize ballot serialization to prevent the same voter from voting twice are not recommended by ES&S as these methods risk voter identity if not managed correctly. This functionality is supported in the current EVS 5000 configuration through election official intervention.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.1.1.15	Capable of setting up multiple elections for City/Town with option of all mail elections.	Mandatory	Yes	Yes	The ElectionWare system does not differentiate between all mail and regular precinct count or central count elections. The County will have the ability to setup multiple elections for its City/Towns at any time, using the Home module of the ElectionWare EMS. These elections can then be used with any ballot submission process the County wants to use. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.1.1.16	Ability to pull up a ballot image.	Mandatory	Yes	Yes	The ElectionWare EMS is built to allow election and technical staff to retrieve and review ballot images, including write-in ballots, after ballots have been scanned. Staff will be trained on how to accomplish these tasks during the ElectionWare User Operations Course. Ballot images can be exported from the DS850 to USB flash drives for electronic review or printed on laser printers. All ports for connecting USB devices are located behind lockable doors. Each of these locations contains a provision for a wire seal for an additional level of security. The EVS software can be configured to save the front and back images of all processed ballots or just ballots containing write-in votes. For every ballot cast, the tabulator stores a CVR file. Additionally, if the DS850 tabulators are configured to store ballot images, a front-and-back image is also stored. The ballot CVR and the images are signed by a machine-specific private key. When results are transferred, these CVR files and images encrypted and signed again to allow for secure transport. The ballot images are stored in a TIFF format. Since the image files are encrypted, the files on the election media are not externally viewable. The election media after being read into ElectionWare can be viewed in the Produce module. There are numerous search/filtering options (such as Precinct, Poll Place, Machine, ballot conditions) available to retrieve the ballots of interest. The CVR for the ballot image also can be viewed alongside the ballot. There is an export facility in ElectionWare's Produce module that allows the user to export the ballot images to a PDF file that can be viewed used an external PDF Viewer. During export, the ballots can be filtered down by any district and or party combination. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.1.2.1	Software works with commercial off the shelf (COTS) hardware, computers/servers, monitors, and operating system.	Preferred	Yes	Yes	The system is based on either a Microsoft Windows 7 PC set up for full election support, or a Windows 2008 Server with Windows 7 client workstations in a closed network. The network switch is also COTS. This functionality is included in the current EVS 5000 configuration.
3.1.2.2	Capable of handling electronically transmitted results from different groups transmitted simultaneously into the same precinct and tabulated automatically.	Preferred	Yes	Yes	With the understanding that the County does not intend to modem results from the precincts, our proposed results accumulation software, Election Reporting Manager (ERM) can accumulate results from different groups into the same precinct automatically. This functionality is included in the current EVS 5000 configuration.
3.1.2.3	Capable of managing multiple precincts without exchanging memory media. Document upper limit on number of precincts.	Preferred	Yes	Yes	The proposed system has been tested and certified to handle 9,900 precincts in an election. Placing multiple precincts on the same media for use at a single polling place is common. For most elections, it is even possible to place all precincts on a single media device for Early Voting or Absentee Voting use. This functionality is included in the current EVS 5000 configuration.
3.1.2.4	System can be programmed with an import utility for importing district, precinct, office, candidate, and voter registration data from the existing Voter Registration system.	Preferred	Yes	Yes	ElectionWare contains a flexible import wizard that accepts election data in the form of delimited files. Every component of election data needed to create ballots can be imported. Examples of data that can be imported include precincts, political districts, offices, candidate information, poll sites, and jurisdictional-specific data. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.1.2.5	System compatible with a variety of proprietary voter registration systems	Preferred	Yes	Yes	The ElectionWare EMS and its subsidiary components are capable of interfacing with a variety of proprietary voter registration (VR) systems. Electionware includes import and export IDs for all data elements in order to easily integrate with other systems. This functionality is included in the current EVS 5000 configuration.
3.1.2.6	System sorting/out-stacking options are configurable.	Preferred	Yes	Yes	The DS850 central scanner has three ballot bins for sorting ballots. Bins can be configured in ElectionWare; many options can also be changed on the unit itself. One bin is reserved for uncounted ballots, one for counted ballots, and one for ballots containing write-ins that may or may not be counted. Sort criteria include unreadable, ballot too long or too short, invalid ballot ID, invalid precinct, unclear marks, blank, undervotes, overvotes, write-ins (oval marked), write-ins (oval not marked) and crossovers (open primaries). This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
Results and Reports					
3.2.1.1	Generates presentable, Pinal County configurable web results, listing proportion of precincts reported for each contest and displaying precinct-level results.	Mandatory	Yes	Yes	The reporting management software creates an XML results file that can be configured to create web results. This functionality is included in the current EVS 5000 configuration.
3.2.1.2	Generates pre- and post-election reporting with the following data: 1) contests and candidates in election, 2) precinct attributes such as Voter Registration totals, races, splits etc., 3) candidate rotations by contest and precinct, 4) Voter Registration totals, 5) precincts reported, 6) linked precincts and districts, 7) contest by precinct, 8) ballot styles by precinct and by district, 9) headers by precinct, 10) statement of votes cast detailing all contests and precincts, 11) election "milestones" by precinct such as programming, burning media, reporting results, 12) proofing report for proofing candidates, contests and "Vote For" number.	Mandatory	Yes	Yes	The proposed solution produces both pre-formatted reports and real-time querying and reporting of listed election data. Real-time reports can be filtered for any or all attributes and associations of any data element and then exported to an Excel spreadsheet. This functionality is included in the current EVS 5000 configuration.
3.2.1.3	Application must supply an export utility that extracts current/up to date election results allowing client to display election results via the web.	Mandatory	Yes	Yes	The reporting management software can export the current/up to date XML results file that can be configured to display election results via the web. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.2.2.1	System is capable of reporting results by central count batch for purposes of hand count auditing.	Preferred	Yes	No	Not contained in current EVS 5000 configuration. However, this can be accomplished procedurally as follows: Back up results on a media device after each batch is run on the DS850 and label the election media. Clear the DS850. Print selected media/batch results as required for specific batch audit. The reporting management software would aggregate batch results for reporting.
3.2.2.2	Reports can be sorted by various fields.	Preferred	Yes	Yes	ElectionWare data can be sorted, filtered, and searched in a table view. Data can be exported to an Excel spreadsheet for additional sorting. The software to manage election reporting, Election Reporting Manager, has numerous reports with options for including various factors like overvotes/undervotes and calculating percentages. It also enables the user to select what precincts and/or contests to include on a given report. Summary reports include options to print candidates in vote order. Exporting the report data to Excel provides further sorting options. This functionality is included in the current EVS 5000 configuration.
3.2.2.3	Capable of conducting all mail and precinct elections simultaneously	Preferred			The EMS is able to manage all mail and precinct counted ballots simultaneously. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
Ballot Design					
3.3.1.1	Ballot counter, central count, and ballot layout software accommodate multiple ballot length options, up to or exceeding 18". Document options available.	Mandatory	Yes	Yes	This functionality is included in the current EVS 5000 configuration. The following ballot lengths are available with our proposed system: - 8.5 x 11" Ballots with 4 or 5 Targets per inch - 8.5 x 14" Ballots with 3, 4 or 5 Targets per inch - 8.5 x 17" Ballots with 3, 4 or 5 Targets per inch - 8.5 x 19" Ballots with 3, 4 or 5 Targets per inch ElectionWare also allows for a variety of columns using the 24 columns available. This functionality is included in the current EVS 5000 configuration.
3.3.1.2	Ballots are printable by a commercial printing vendor selected by Pinal County.	Mandatory	Yes	Yes	Yes, ballots can be printed by a commercial print vendor selected by Pinal County. After an election official approves the ballot layout, the official or ES&S sends a PDF file of the layout to the printer. The PDF file can be transmitted by e-mail or other electronic communications. This functionality is included in the current EVS 5000 configuration.
3.3.1.3	System outputs .PDF or .PS files with cut marks and fold marks for printer use.	Mandatory	Yes	Yes	ElectionWare outputs a .PDF containing cut marks and other registration marks to aid the commercial printer in creating ballots to specification. This functionality is included in the current EVS 5000 configuration.
3.3.1.4	Same ballot style is usable in any counter group assigned to the precinct regardless of counter group and precinct arrangement.	Mandatory	Yes	Yes	ElectionWare allows the same ballot style to be used in any counter group assigned to the precinct, regardless of counter group and precinct arrangement. For example, the same ballot style could be used for an Absentee counter group or as an Election Day counter group. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.3.2.1	Supports ballot printing on non-proprietary, non-copy written, blank ballot stock.	Preferred	Yes	Yes	ES&S recommends the use of ballot stock containing the same specifications found in our CountRight™ Digital Ballot Stock to assure the highest level of accuracy and reliability from the DS850 central count scanner. Ballots printed on CountRight stock were used by the EAC VSTL testing lab during Federal certification. CountRight is available to the County or its printer in two ways. First, as the only authorized distributor of CountRight ballot stock, Xpedx, North America's largest paper distributor, offers CountRight parent sheets and rolls in a variety of sizes and formats. Second, ES&S stocks and markets CountRight Digital Ballot Stock in various sizes and formats. This pre-cut stock is blank with no pre-printing on it. Use of CountRight stock will provide you assurance that your ES&S tabulator performs as designed. This functionality is included in the current EVS 5000 configuration.
3.3.2.2	System produces ballots designed to prevent ink bleed through from affecting targets and timing marks on the other side of the ballot.	Preferred	Yes	Yes	The 80# ES&S CountRight™ ballot stock paper coupled with the ES&S recommended specifications for ballot printing will prevent bleed through or smear affecting targets and timing marks on the opposite side of the ballot. This functionality is included in the current EVS 5000 configuration.
3.3.2.3	System provides on screen preview of both paper ballot and ADA ballots with a WYSIWYG user interface.	Preferred	Yes	Yes	ElectionWare provides an on-screen, WSIWYG preview of ballots, both for ElectionWare creation of paper ballots and for ballot information viewed on the ballot marking accessible device, the ES&S AutoMARK. This functionality is included in the current EVS 5000 configuration.

Statement of Work Number	Requirement Statements	Pinal County Priority	Meets Statement of Work Requirement (Yes or No)	Is support for this included in your proposal?	If "No", provide brief comments
3.3.2.4	System automatically adds correct number of write-in lines to coorespond to number to be elected.	Preferred	Yes	Yes	When user adds a contest in ElectionWare, they add the number of candidates to vote for. If there are write-ins, the system adds by default write-in lines for that number of candidates. This functionality is included in the current EVS 5000 configuration.
3.3.2.5	Space available on the ballot for a printed barcode.	Preferred	Yes	Yes	ElectionWare can be used to design ballots with space available for printed barcodes. The barcodes would need to maintain minimum distances from ballot-timing marks and other elements to avoid interference with the ballot tabulation process on the DS850. Contained in current EVS 5000 configuration.
3.3.2.6	Capable of printing a unique ballot identifier on individual ballots as they are tallied to prevent multiple counting of ballots.	Preferred	Yes	No	Not contained in current EVS 5000 configuration. The DS850 hardware supports the use of an optional ballot imprinter which is capable of printing a unique identifier each time the ballot is scanned to give a visual indicator that the ballot has been previously scanned. Counted ballots have this unique number embedded in the file names of the image and CVR files to further facilitate ballot review and the correlation of paper ballots to ballot images. The imprinter has not been certified, but could be added to the certification of a future version upon request by a customer. In addition, see our response to SOW # 3.1.1.14 which discusses the risks of voter identity by using ballot serialization.

Response Form 3
Pricing Sheet

Firm Fixed Rate

Instructions:

- Vendor's cost proposal must be submitted on this form.
- Unless you specifically provide otherwise, Pinal County will consider all proposed costs to be fixed.
- Each item required by the bid must be individually priced (i.e. priced per single unit) and be able to be ordered individually.
- Vendor's cost proposal represents the not-to-exceed cost to Pinal County.
- The prices quoted must remain valid for twelve (12) months from the proposal submission deadline.
- Proposer agrees to free on board (F.O.B.) destination (i.e. no delivery charges).
- Proposer is responsible for verifying that their cost submission is accurate and complete.

HARDWARE

Volume Discount Provision: Under the contract, each purchase shall be made at the current quantity Unit Price. However, the total number of ADA Voting Units ordered by any Arizona governmental entities under the contract, within eighteen (18) months of the last signature date on the contract, shall determine the final quantity Unit Price. Within forty-five (45) days of the eighteenth (18th) month anniversary of the last signature date on the contract, a rebate shall be paid by vendor to Pinal County (or any other governmental entity) for the difference between the current quantity Unit Price paid to vendor and the final quantity Unit Price, which shall apply to every ADA Voting Unit ordered. The vendor will be responsible for tracking rebate eligibility.

For example, if Pinal County buys the first 100 units at the current quantity Unit Price $X for quantity 1-100, and at the end of the eighteenth (18th) month anniversary of the last signature date on the contract the total number of ADA Voting Units ordered by all Arizona governmental entities is 150 units and the final quantity Unit Price is $Y for quantity over 100, then vendor will rebate to Pinal County ($X-$Y x 100 number of units).

ADA / HAVA Compliant Voting Unit – Model: AutoMARK Voter Assist Terminal (Proposer fills in model number)

Pricing Includes: AutoMARK Voter Assist Terminal with Transport Case, Backup Battery, Power Cord, Ink Cartridge, Two (2) 1GB Flashcards, Headset, Two (2) Secrecy Sleeves, Firmware, Shipping & Handling, and Bonding.

Note: For the sake of clarity, the software included in these amounts is the firmware that resides on the unit.

Quantity	Unit Price
1-50	$1,081.00
51-100	$1,081.00
101-150	$1,081.00
151-200	$1,081.00

Central Counter – Model: DS850 (Proposer fills in model number)

Pricing Includes: Model DS850 Scanner, Steel Table/Cart, Start-up Kit, Dust Cover, Reports Printer, Audit Printer, Battery Backup, Two (2) USB Cables, Three (3) 8GB Thumb drives, Firmware, Shipping & Handling, and Bonding.

Note: For the sake of clarity, the software included in these amounts is the firmware that resides on the unit.

Quantity	Purchase Unit Price	Extended Cost
2	$113,607.00	$227,214.00
5	$108,557.00	$542,785.00
10	$100,967.00	$1,009,670.00

Standalone Server and Workstation– Server Model: Dell PowerEdge T420 (Proposer fills in model number)

Workstation Model: Dell OptiPlex 7010

Quantity	Purchase Unit Price	Extended Cost
Server - 2	$7,501.00	$15,002.00
Workstation - 1	$2,252.00	$2,252.00

Note: On-Site installation of servers and work stations is available at the rate of $2,300.00 per day.

SOFTWARE

Separate pricing for software, if hardware is purchased.

Software – Model: ElectionWare (Proposer fills in model number)
Pricing Includes: Electionware Software PYO Standard Base Package including Election Results Software, Synthesized Audio Capability for the English Language, and Synthesized Audio Capability for One Additional Language

Quantity	Unit Price
One Enterprise Wide License	$63,335.00

SERVICE / MAINTENANCE AGREEMENT

Separate pricing for software/hardware Service Agreement, if hardware is purchased.

Description	Unit Price
Software Service Agreement	See Software Maintenance Agreement Pricing
Hardware Service Agreement (Firmware License and Maintenance & Support Services) - AutoMARK Voter Assist Terminal - DS850 Scanner	 $60.00 per year/per unit $1,500.00 per year/per unit
Software Maintenance Agreement (ElectionWare License and Maintenance & Support Services	$63,335.00 per year
Hardware Maintenance Agreement: AutoMARK Voter Assist Terminal: - Gold Maintenance Program (Preventative Maintenance Service Once Every 12 Months) - Silver Maintenance Program (Preventative Maintenance Service Once Every 24 Months) - Bronze Maintenance Program (Repair Service Only with Preventative Maintenance Performed During Repair Services) DS850 Scanner: - Gold Maintenance Program (Preventative Maintenance Service Once Every 12 Months) - Silver Maintenance Program (Preventative Maintenance Service Once Every 24 Months)	 $280.00 per year/per unit $177.50 per year/per unit $105.00 per year/per unit $3,900.00 per year/per unit $2,440.00 per year/per unit

Annual cost of Service / Maintenance Agreement may not escalate by more than 1% per year for each year of the contract, including extensions.

Responder must include a copy of its proposed Service Level Agreement with its proposal.

IMPLEMENTATION

Please itemize all implementation expenses below, including planning and analysis, design and development, testing, deployment and support, and reimbursable expenses (e.g. travel). Also, itemize the total implementation hours and hourly rates per job category for implementation staff. Please include a total of implementation expenses expected to meet the May 19, 2014 implementation deadline.

Description	UOM	Qty	Rate	Total
DS850 Installation/Training Fee (1st Unit)	Unit	1	$3,550.00	$3,550.00

DS850 Installation/Training Fee (Each Additional Unit)	Unit	1	$1,015.00	$1,015.00
DS850 Election Day On-Site Support (One Event includes a person on-site the day before, day of, and day after election)	Person per Event	1	$4,185.00	$4,185.00
Project Management	Day	10	$1,600.00	$16,000.00
Election Day On-Site Support (One Event includes a person on-site the day before, day of, and day after election)	Person per Event	2	$4,185.00	$8,370.00
Installation/Acceptance Testing AutoMark	Unit	100	$107.00	$10,700.00

Total Implementation Expense $ 43,820.00

Note: Total Implementation Expense is based upon the purchase of two (2) DS850 scanners and one hundred (100) AutoMARK Voter Assist Terminals. DS850 Installation/Training Fees and AutoMARK Installation/Acceptance Testing Fees will be adjusted according to the final purchase quantities.

TRAINING

Please itemize all training expenses below, including reimbursable expenses (e.g. travel). Also, itemize the total expected training hours and hourly rates per job category for training staff. Please include a total of training expenses expected.

Description	UOM	Qty	Rate	Total
Equipment Operations Training	Day	1	$1,600.00	$1,600.00
Poll Worker Train-the-Trainer	Day	2	$1,600.00	$3,200.00
Software Training	Day	5	$1,600.00	$8,000.00

Total Training Expense $ 12,800.00

Note: All Implementation and Training services include travel and per diem expenses.

TRADE-IN AND DISCOUNT ALLOWANCES

Description	Quantity	Unit Trade-In Allowance	Total Trade-In Allowance
AccuVote OS Scanner with Ballot Box and Memory Cards	98	$250.00	$24,500.00
AccuVote TSX Terminal with Printers, Stands, and Memory Cards	98	$75.00	$7,350.00

Total Trade-In Allowance $ 31,850.00

Total Additional Discount $ 15,000.00

CONSUMABLE SUPPLIES – As determined by vendor

Itemize quantity and price for the following consumable supplies: thermal paper, printer ribbons, fuses, batteries, memory devices, marking pens, and other supplies necessary to operate the election equipment system. Please include a total consumable supply estimate per election.

Consumables Description	Unit Price	Estimated Price per Election (See Note)
DS850 Consumables:		
Okidata B430DN Toner (Item #6826) - One (1) toner will last multiple elections. Recommend one (1) spare on-hand.	Included in DS850 Start-Up Kit. Replacement price: $75.00	$37.50 based upon 2 units
ML420 Printer Ribbon (Item #RI-420) - One (1) ribbon will last multiple elections. Recommend one (1) spare on-hand.	Included in DS850 Start-Up Kit. Replacement price: $15.00	$7.50 based upon 2 units
1-Part Printer Paper (Item #ES-PP1) - One (1) box will last multiple elections.	Included in DS850 Start-Up Kit. Replacement price: $43.00	$21.50 based upon 2 units
8 1/2" x 11" Standard Printer Paper (500 sheets) - Two (2) reams of paper per election	One Ream Included in DS850 Start-Up Kit. Replacement price: $5.00	$20.00 based upon 2 units
Touch Screen Cleaning Kit (Item #6500) - Will last multiple elections. Replace when cleaning rag is dirty.	Included in DS850 Start-Up Kit. Replacement price: $7.75	$3.90 based upon 2 units
Alcohol Isopropyl (Item #ES-AL) - One (1) bottle will last multiple elections. Recommended one (1) spare on-hand.	Included in DS850 Start-Up Kit. Replacement price: $4.25	$2.10 based upon 2 units
Compressed Air (Item #ES-AR) - Two (2) cans should last multiple elections. Recommend one (1) spare on-hand.	Included in DS850 Start-Up Kit. Replacement price: $9.50	$4.70 based upon 2 units
UPS Battery Backup (Item #4779) - 3 to 5 year life depending upon usage	Included with DS850 unit. Replacement price: $410.00	$102.50
Motherboard Battery - 6 to 10 year life depending upon usage	Included with DS850 unit. Replacement price if done during a preventative maintenance visit: $10.00	$2.50

Consumables Description	Unit Price	Estimated Price per Election (See Note)
AutoMARK Consumables:		
Touch Screen Cleaning Kit (Item #6500) - Will last multiple elections. Replace when cleaning rag is dirty.	$7.75	$1.95
Ink Cartridge (Item #87002) - Minimum of one (1) per unit/per election. Dependent upon, among other factors, number of voters using the AutoMARK, size of ballot, number of marks per ballot, etc.	$30.00	$3,000.00 based upon 100 units
Ink Pad (Item #86016) - Can last multiple elections. Dependent upon, among other factors, number of voters using the AutoMARK, size of ballot, number of marks per ballot, etc.	$0.27	$27.00 based upon 100 units
Wire Roto 8" Seal (Item #86022) - Required if sealing the flashcard door. One (1) per election but recommend spares should access to the flashcard be required during the election.	$0.40	$40.00 based upon 100 units
Headset Ear Cover (Item #86003) - Dependent upon number of voters using the AutoMARK headset to cast their ballot.	$0.15	$132.00 based upon 2% of early voters using headphones
Backup Battery- 3 to 5 year life depending upon usage	Included with unit. Replacement price if done during a preventative maintenance visit: $112.90	$1,161.13 based upon 100 units
Motherboard Coin Cell Battery- 3 to 5 year life depending upon usage	Included with unit. Replacement price if done during a preventative maintenance visit: $10.00	$125.00 based upon 100 units
Total Consumable Supply Estimate per Election		**$4,689.28**

Note: ES&S has included many of the consumable items listed above in the start-up kits that ship with the unit or, are included with the unit. The total Consumable Supply Estimate per Election is based upon an estimated average usage, per election, and is subject to change based upon actual usage. Total price reflects a combination of the price of consumables that require replacement each election plus the estimated average usage per election if the consumable item description designates it will last over multiple elections.

CONTINGENCY PLAN PRICING

(used only in the event solution is not operational by May 19, 2014 deadline)

Description:	**Unit Price:**
Ballot programming and design	ES&S will provide ballot programming and design to the customer at no-charge for the May 2014 Election should the ElectionWare Software solution not be operational for Pinal County to perform their own Ballot Programming and Design.

Total Price of Hardware and Software for Tax Calculation (Based upon two (2) DS850's: one hundred (100) AutoMARK Terminals, two (2) servers, one (1) workstation, and applicable discounts. $369,053.00

Total Services: $ 56,620.00

Add: Taxes on Hardware and Software @ 8.70%: $ 32,107.61

Total Purchase Price Including Applicable Taxes: $457,780.61

Note: Taxes are calculated using a tax rate of 8.70% of the total purchase price of $369,053.00 for hardware and software (services are not taxable if stated separately) and assumes delivery within the city limits of Florence, AZ. Amount is subject to change based upon any changes in quantities and/or tax rates.

OPTIONAL ADA/HAVA COMPLIANT VOTING SYSTEM UPGRADE: Upon Arizona certification of the ExpressVote Unit the County could upgrade from the AutoMARK Voter Assist Terminal to the ExpressVote System. The ExpressVote System would include the ExpressVote Unit, Backup Battery, Soft-Sided Case, Detachable ADA Keypad, Two (2) 4GB Flash Drives, Headphones, Firmware, Shipping & Handling, and Bonding.

Note: For the sake of clarity, the software included in these amounts is the firmware that resides on the unit.

Quantity	Unit Price
1-50	$3,681.00
51-100	$3,691.00
101-150	$3,691.00
151-200	$3,691.00

Optional ExpressVote Items:

ExpressPass Printer:

Quantity	Unit Price (If Ordered at Time of ExpressVote Terminal Purchase)
1-50	$735.00
51-100	$735.00
101-150	$735.00
151-200	$735.00

ExpressVote Booth:

Quantity	Unit Price (If Ordered at Time of ExpressVote Terminal Purchase
1-50	$430.00
51-100	$430.00
101-150	$430.00
151-200	$430.00

ExpressVote Consumable Items:

Consumables Description	Unit Price	Estimated Price per Election (See Note)
ExpressVote Consumables:		
Touch Screen Cleaning Kit (Item #6500) - Will last multiple elections. Replace when cleaning rag is dirty.	$7.75	$1.95
ExpressVote Ballot Card Stock (250/pkg) 11" (Item #70-00001) 14" (Item #70-00002) 17" (Item #70-00003) 19" (Item #70-00004)	 $20.00 $22.50 $25.00 $30.00	$80.00 based upon 1,000 11" ballot cards per election
Wire Roto 8" Seal (Item #86022) - Required if sealing the flashcard door. One (1) per election but recommend spares should access to the flashcard be required during the election.	$0.40	$40.00 based upon 100 units
Security Tag Seals (Item #RISBL) – One (1) per election but recommend spares should access to the unit be required during the election.	$0.41	$41.00 based upon 100 units
Headset Ear Cover (Item #86003) - Dependent upon number of voters using the ExpressVote headset to cast their ballot.	$0.15	$132.00 based upon 2% of early voters using headphones
Backup Battery (Item #290-00038) - 3 to 5 year life depending upon usage	Included with unit. Replacement price if done during a preventative maintenance visit: $112.90	$1,411.13 based upon 40 units
Motherboard Coin Cell Battery (Item #2283) - 3 to 5 year life depending upon usage	Included with unit. Replacement price if done during a preventative maintenance visit: $10.00	$125.00 based upon 40 units
Total Consumable Supply Estimate per Election		**$1,831.08**

Note: The total Consumable Supply Estimate per Election is based upon an estimated average usage, per election, and is subject to change based upon actual usage. Total price reflects a combination of the price of consumables that require replacement each election plus the estimated average usage per election if the consumable item description designates it will last over multiple elections.

Election Systems & Software, LLC/Richard J. Jablonski

Firm/Individual

Richard J. Jablonski, 4/8/14

Authorized Signature and Date

END OF PRICING SHEET

Features Questionnaire Supplemental Responses

Question 2.8: Describe the proposed training plan for Pinal County staff on programming elections using your system. This should include number of hours of live instruction, training materials available, number of staff that can be accommodated per training session, and additional cost of training, if any.

ES&S RESPONSE

ES&S proposes a series of training sessions proven to be effective in teaching election staff how to operate and administer the DS850, AutoMARK, ElectionWare, and Election Reporting Manager (ERM) systems.

Overview of Training for Pinal County

The training for Pinal County staff will encompass key learning outcomes that will focus on the success of the training participant in operating the equipment and software. Courses will combine classroom and online (WebEx) courses primarily offered at Pinal County facilities. ES&S limits the number of students in the hardware operations courses to 20 and software and "Train the Trainer" courses to 10 participants to allow as much hands-on training with the new voting equipment as possible.

The curriculum for the hardware courses reinforces the procedural steps that the student will have to perform to be successful on Election Day. Software courses expose the students to all facets of using the application for election setup, ballot layout, programming, and reporting functions. Students will be provided up-to-date training documentation that is easy to understand and can be used by the student independently when questions arise.

On-going training can be conducted by County trainers who have completed the ES&S "Train the Trainer" (TTT) curriculum. During the two-day TTT course, the County trainer will have plenty of opportunity to simulate teaching their peers to gain confidence, knowledge, and feedback on their performance.

To summarize: ES&S will work with Pinal County to develop a training plan that incorporates initial and on-going hardware, software, and TTT courses for a variety of audiences, including election staff, county technicians, and poll workers.

Our Training Approach for Staff Employees

When implementing a new election system, initial training must be a primary consideration. ES&S measures the success of new installations by the ability of our clients to more efficiently manage their election process using our systems. Our comprehensive training program has been developed to promote a strong level of competency for all intended users. A series of training modules has been developed that provide successful participants of your election team with the skills to perform necessary operations. Well-written training documentation that is easy to understand and can easily referenced when needed will be provided to each participant who attends training.

While we have developed a standard curriculum approach, we believe a key element in a successful implementation is the appropriate customization and integration of our training to incorporate state and county laws, regulations, and procedures. ES&S will work with Pinal County election staff to develop a training plan that is current and relevant to you.

The curriculum is designed using theory and methods that are best for adult learning. Course instruction uses audio, visual, and hands-on demonstrations and exercises. The manuals and job aids are designed to complement the course instruction and provide simulation of election activities. The evaluation of the

course and transfer of knowledge has been completed in many ways. Customized job aids and testing materials can be developed to meet the individualized needs of Pinal County.

At ES&S, we know the successful implementation and continuous operation of any new voting system directly hinges on an effective training program for election personnel and voters. We know that training is the linchpin of any installation and support plan for the election system. So ES&S takes great pride in providing our clients extensive, world-class voting system training programs. ES&S will be there for you when your team requires on-going training to refresh them on the procedures to safely and efficiently operate equipment and software.

ES&S training provides hands-on instruction to election staff responsible for administering and managing the proposed system. ES&S recommends conducting training in a facility that allows attendees access to the system for hands-on instruction. For Pinal County training, ES&S will conduct training in your facilities. Below is a summary of the recommended training syllabus:

Training Type	Intended Audience	Facility Requirements	Course Duration	Comments
DS850 and AutoMARK Hardware Operations User Courses	Election staff and machine operators	Classroom to hold full class of participants and equipment	DS850 and AutoMARK: 1 day total	Recommendation is no less than one piece of equipment per every two participants. Hardware classes have a maximum of 20 participants.
Train the Trainer Course (Prerequisite: Hardware Operations User Courses)	County training staff	Classroom to hold full class of participants and equipment	2 days	Train the Trainer classes have a maximum of 10 participants. Allows the County trainers to train officers.
ElectionWare Election Management System Software User Course	County Election Office staff, IT personnel	Classroom to hold full class of participants and desktop or laptop computers	4 days	Software classes have a maximum of 10 participants.
Election Reporting Manager (ERM) User Course	County Election Office staff, IT personnel	Classroom to hold full class of participants and desktop or laptop computers.	1 day	Software classes have a maximum of 10 participants.

Question 2.10: Describe the approach used in providing hardware and software support. This should include type of support available (remote/on site), hours available, topics supported (hardware troubleshooting, election programming), and additional cost for access.

ES&S RESPONSE

The ES&S Help Desk operates out of our corporate headquarters in Omaha. The Help Desk operates from 7 a.m. to 7 p.m. Central time, Monday through Friday. Customers requiring hardware or software assistance place a call into our Help Desk via a toll-free number (1-877-377-8683) and select the option for Hardware or Software.

Customers requiring assistance outside these hours may call the Help Desk and leave a message. The on-call technical support representative will return your call as soon as possible. You may also call your ES&S dedicated Account Manager's cell phone for assistance. Our goal is to make ourselves available to anyone on your staff when you need us. Customers may also send a Help Desk request through e-mail or facsimile. Customers can expect to receive a reply or callback immediately from their Account Manager/Help Desk during peak election activity or within 4 hours during non-election periods.

ES&S offers multiple support channels to assist customers with issues and concerns ranging from simple "how-to" questions for ballot layout and programming to complex hardware and software troubleshooting assistance when needed. The multiple channels for contacting us include:

- **Toll-free support** – Customer support is available by telephone, fax or e-mail to our Omaha Help Desk. Our dedicated toll-free customer support telephone number is 877-ESS-VOTE (877-377-8683). The support line is open 24 hours a day and representatives monitor the line from 7 a.m. to 7 p.m. (Central), Monday through Friday. During Federal and statewide election-critical periods (Election Day minus 2 weeks), we augment our Help Desk staff and hours to ensure we are there to take your call.
- **E-mail support** – Customers can communicate directly with their dedicated Account Manager or specialized ES&S Help Desk support and technical representatives via e-mail.
- **FAX support** – Facsimile support is available at our corporate headquarters at (402) 593-8107. Customer requests or inquiries arriving at this number are distributed to the appropriate office within ES&S for immediate response.
- **www.essvote.com** – ES&S' corporate Web site is continuously updated with new product and company information. This resource includes ES&S contact information to ensure timely answers and effective communications.
- **Customer portal** – Each customer will be provided a user name and password to access the ES&S customer portal. The portal contains copies of all user documentation to include Standard Operating Procedure manuals and technical bulletins. In addition, the portal provides access to ES&S Election Services forms, RMA request forms, user manuals, and a link to the ES&S Supply Store.
- **WebEx support** – ES&S uses WebEx as our remote desktop assistance tool to provide over-the-shoulder assistance when needed.

Hardware troubleshooting. Pinal County staff can perform routine DS850 troubleshooting and minor corrective-action maintenance tasks with appropriate training and support from ES&S. Advanced maintenance activities, such as significant system upgrades and extensive corrective maintenance, should be completed only by ES&S technicians. These advanced tasks can all be completed onsite.

Question 2.11: Describe system capabilities with regard to retrieval of ballot images, if any. Include how images are accessed and by whom, security features around access, file types supported, description of protocol used to de-couple ballot image from voter order, and any other ballot image search or adjudication features.

ES&S RESPONSE

The ElectionWare Election Management System (EMS) is built to allow election and technical staff to retrieve and review ballot images, including write-in ballots, after ballots have been scanned. Your staff will be trained on how to accomplish these tasks during the ElectionWare User Operations Course described in **Question 2.8**.

Ballot images can be exported from the DS850 to USB flash drives for electronic review or printed using the county's laser printers. All ports for connecting USB devices are located behind lockable doors. Each of these locations contains a provision for a wire seal for an additional level of security.

The EVS software can be configured to save the front and back images of all processed ballots or just ballots containing write-in votes. For every ballot cast, the tabulator stores a Cast Vote Record (CVR) file.

Additionally, if the DS850 tabulators are configured to store ballot images, a front-and-back image is also stored. The ballot CVR and the images are signed by a machine-specific private key. When results are transferred, these CVR files and images encrypted and signed again to allow for secure transport. The ballot images are stored in a TIFF (Tagged Image File Format) format. Since the image files are encrypted, the files on the election media are not externally viewable.

The election media after being read into ElectionWare can be viewed in the Produce module. There are numerous search/filtering options (such as Precinct, Poll Place, Machine, ballot conditions) available to retrieve the ballots of interest. The Cast Vote Record for the ballot image also can be viewed alongside the ballot.

There is an export facility in ElectionWare's Produce module that allows the user to export the ballot images to a PDF file that can be viewed used an external PDF Viewer. During export, the ballots can be filtered down by any district and or party combination. There are also options to include the CVR for the image and to apply a watermark to the PDF file.

Every ballot cast is assigned a random 16-byte identifier and all the ballot CVRs and ballot images are stored with exactly the same timestamp. This effectively decouples any association of the ballot to the voting order impossible to guarantee voter privacy.

Question 2.12: Describe in detail the security protocols included in the system for maintaining integrity and preventing or revealing tampering with results including export/import of cast vote records, automatic tabulation, etc., as applicable.

Digital security. All DS850 data is signed with FIPS-compliant digital signature algorithms and software and checked for valid signatures when the data is introduced into the machine. All data generated is also signed so the program receiving the data can validate it. ElectionWare incorporates the very latest in election security, including built-in heightened audit controls and change management processes that ensure election data is safe and secure.

The DS850 logs all pass code attempts, whether successful or failed, to the digitally signed audit log. In addition, all user actions (such as administrative menu selections and open and close poll events), whether successful or failed, also are written to the audit log.

All system and user log files are written to the hard disk drive and can be exported for review, at which time they are digitally signed.

Physical security. For the DS850, all ports are protected by lockable, sealable clear plastic doors to protect access and allow election officials to easily detect unauthorized access. The DS850 logs when the imaging heads are accessed. The DS850 provides additional alerts and logs access to the back service door.

Cast Vote Record security. Cast Vote Records (CVRs) can be written to election media for backup purposes without aggregating vote data for reporting purposes. This prevents the data from being read into the EMS system for the purposes of reporting. The aggregation of data is access-code controlled and can be locked out until re-enabled by an administrator. The EMS software also can be password-controlled to limit access to results generation and reporting functions.

Audit log security. The audit logs can be printed to the optional audit log printer using the Report menu of the DS850's user interface. In addition, they can be exported to a USB removable flash drive and taken to an EMS personal computer for review.

Only the DS850 system can create, read, modify, and delete the audit log/inventory as the user interface is locked out of this functionality. All low-level access to the file systems is protected.

Question 2.13: Document threshold for percentage of target marked that will cause mark to count (both ballot counter and central count components).

ES&S RESPONSE

The DS850 Central Count vote tabulator provides full image-based scanning with unparalleled accuracy by using ES&S' patented Intelligent Mark Recognition™ (IMR). IMR gives the DS850 the flexibility to support a wide variety of voter response marks including checkmarks, X's, and partially filled ovals.

ES&S' IMR technology has advanced beyond the more primitive "threshold-only" methods of earlier generations of election systems. ES&S' IMR starts by locating and masking out the oval to allow in-process adjudication of only the voter making the mark.

Locating and masking the oval allows the ES&S mark recognition engine to be more tolerant of ovals that are too thick or dark because of issues in printing, without the need for election administrators to adjust threshold levels with each election.

IMR then takes the pixel counts and determines through in-process adjudication which of the following three levels applies:

1. **Low threshold level.** Marks whose pixel counts fall below this value are considered to be an unmarked response area.
2. **High threshold level.** Marks whose pixel counts fall above this value are considered to be marked response area.
3. **Marginal threshold region.** Marks whose pixel counts fall between the low and high threshold levels are evaluated further by the IMR algorithms. These algorithms are will determine if the mark can be recognized as patterns that are valid marks such as X's, checkmarks, lines, etc. This additional mark detection algorithm greatly reduces the number of valid marks that require

review compared to simple threshold-only methods. Any marks that fall in the marginal threshold region and are not recognized as one of the valid marking patterns are sorted and noted to have "Unclear Marks".

The fixed thresholds for determining whether the response is marked, not marked, or intermediate and requires mark recognition algorithms take into account the size of the oval, the minimum types of mark standard marking devices would make, and the resolution of the cameras being used. These thresholds and algorithms have been exhaustively tested using test ballots that significantly exceed the complexity of ballots required in certification and in use in the field to ensure the highest possible accuracy.

For best results, ES&S recommends ES&S that the BIC® Grip Rollerball Medium Point (0.7mm) with black ink be used to mark ballots read by the DS850.

Question 2.14: Document the core database program on which the Election Management System is based. Include any additional costs to Pinal County to provide database program.

ES&S RESPONSE

ElectionWare stores data for each election separately in a PostgresSQL 8.4 relational database management system. The tables are logically grouped into different schemas based on the election workflow for ease of maintenance and readability. This database manages all workflow functions in election setup, including data gathering (entry or import), ballot layout, and tabulator and reporting system setup. The election definition file set used to configure the tabulators and the reporting system is in XML format.

Election Reporting Manager (ERM) builds its own election-specific reporting database from the files contained on USB flash drive created by ElectionWare. ERM reads the results XML files retrieved from the DS850 USB flash drives and populates its database with the results obtained. Election databases can be stored on a variety of media, including compact disk and flash drive, for archival purposes.

The ElectionWare database is used for an entire election to store all of the jurisdiction's precinct, office, and candidate information. This data is then used by county election officials to define the image of the ballot, on equipment screens and reports, and for election reporting functions. This single data repository ensures the same information is used throughout the election process. ElectionWare also protects against improper data entry or retrieval. Data is verified for correctness at the time it is either imported or entered and during the creation of ballot styles and candidate positions.

Authorized database user roles in ElectionWare include Administrator, User, Ballot Producer, Media Creator, and Ballot Reviewer. The database data directory is only accessible by the operating system administrator group and not by the regular user role. The data is accessed by the database server through a service account, protecting data files from direct access.

Question 2.15: Describe Federal certification process and list exact components that were certified as a complete system. Include any hardware or software items that are or may be considered legacy equipment.

ES&S RESPONSE

The ES&S 5000 Voting System that we are proposing for Pinal County was certified by the U.S. Election Assistance Commission to meet the commission's 2005 Voluntary Voting System Guidelines (VVSG). The EAC granted certification to the EVS5000 system on May 16, 2013.

The following are the VVSG-certified hardware and software items that comprise EVS5000:

Product Name	Product Type	Version	Hardware Version
DS850	Firmware	2.4.0.0	1.0
DS200	Firmware	2.7.0.0	1.2
DS200 Plastic Ballot Box	Firmware	NA	1.2, 1.3
AutoMARK	Firmware	1.8.1.0	A200 v1.1
AutoMARK	Firmware	1.8.1.0	A200 v1.3
AutoMARK	Firmware	1.8.1.0	A300 v1.3
AutoMARK	Firmware	1.8.1.0	A100 v1.0
Election Reporting Manager (ERM)	Software	8.6.0.0	NA
ElectionWare	Software	4.1.0.0	NA
Event Log Service	Software	1.5.0.0	NA
Metal Ballot Box with Diverter	Firmware	NA	1.0, 1.1, 1.2
Metal Ballot Box without Diverter	Firmware	NA	1.0, 1.1, 1.2
PaperBallot	Software	3.1.0.0	NA
Removable Media Service (RMS)	Software	1.4.0.0	NA
Voter Assist Terminal (VAT) Previewer	Software	1.8.1.0	NA

Question 2.16: Describe the user interface for setting up and programming an election, including features for rotation of candidate names, setting up districts and precincts, and multiple ballot options.

ES&S RESPONSE

ES&S' Election Management Software, ElectionWare, allows users to create an election information database, format ballots, program ballot scanning equipment, and generate Election Day reports. ES&S products and services enable you to customize and scale election processes to meet the needs of your jurisdiction.

ElectionWare allows for the different functions of defining the election data, laying out the ballots and configuring and programming the machines, and reading in the voted ballot images within the same software application. The software recognizes changes made in any of its groups and modules and automatically updates all modules without any user intervention required. Multiple ballot options can be easily configured.

Here's a summary of ElectionWare's integrated functionality:

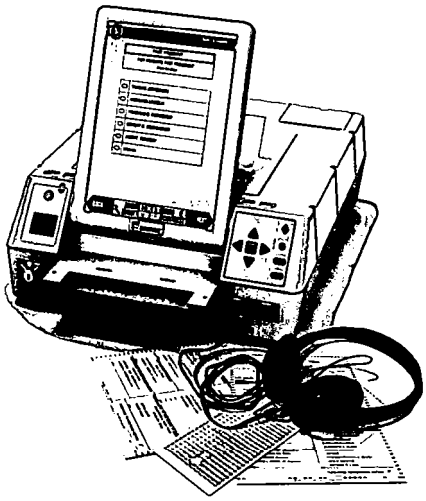
- **Home.** The Home module enables you to create your election, create election templates, and backup and restore elections.
- **Capture.** The Capture module enables you to build your initial election database, enter precinct, district, race, and candidate information, and build appropriate rotations and then ballot sets.
- **Element Library.** The Element Library Module enables you to create system files and system screens for your AutoMARK devices. This ability includes creating audio files and any necessary translations.

- **Paper Ballot.** The Paper Ballot module enables you to build your paper ballots and apply various configurations, templates, and style sheets. Through finalizing the database, this module also provides you with the ability to produce Ballot on Demand (BOD) files for your election.
- **Accessible Ballot.** Accessible Ballot provides the ability to format both onscreen aspects of ballots when viewed on AutoMARK devices as well as the audio files necessary for the current election.
- **Configure Equipment.** Through Configure Equipment, you can configure equipment settings for the current election.
- **Package.** The Package module enables you to create the necessary media for your election.
- **Print.** Use the Print module to print BOD ballots by precinct from the Print module.
- **Acquire.** This module is used to load results files and view data related to media devices encoded for the election. Poll place records can be viewed, saved to file, and printed. If required, results loaded from selected media storage devices(s) can be cleared from the database or all loaded results can be cleared from the database.
- **Produce.** This module is used to filter, display, and export ballot data from loaded results data. Ballot records can be viewed and exported to file. The scan images or facsimiles of ballots associated with selected ballot records and their Cast Vote Records can be viewed, printed, and saved. The Election Results Summary report, which includes the results of all loaded ballots, can be viewed, printed, and saved.
- **Manage.** The Manage module enables you to create users, jurisdictions, set password policies, and various other administrative functions.

The results database for ERM is created based on a memory stick created from ElectionWare. After tabulator and ERM media has been created, if any layout or programming is changed, depending on the nature of the change, the affected tabulator media and or ERM media may need to be recreated. If ERM media is recreated, the ERM database must be updated with the changes.

Question 2.17: Describe the ADA unit, including any peripherals (carrying cases, headphones, etc.) Document any optional equipment not included in Cost Proposal.

ES&S RESPONSE



ES&S AutoMARK Voter Assist Terminal with headphones

Accessible Voting System
ES&S AutoMARK Benefits

- Complies with all HAVA and ADA accessibility requirements for assisting voters with disabilities.
- Vibrant color touch screen supports multiple ballot languages.
- Eliminates over-voting. Displays a warning message for voters who under-vote a contest.
- Write-in capability for visual or audio ballot.
- Durable carrying case protects the terminal from damage during transport.
- Ballot summary screen enables voters to confirm all selections prior to marking their ballots.

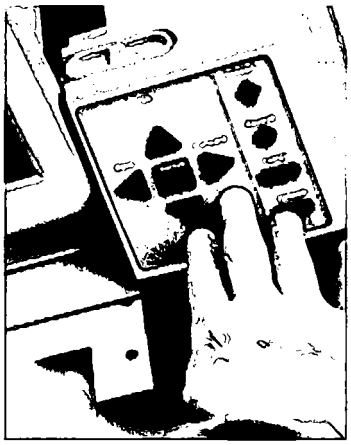
The **ES&S AutoMARK® Voter Assist Terminal** helps voters with vision and mobility impairments mark standard paper ballots without assistance. The terminal's robust audio ballot and support for multiple languages also assists voters who are more comfortable reading or hearing ballot contents in an alternative language to cast their vote independently.

The terminal's touch screen controls and keypad buttons are interconnected. Voters can use either system to navigate the ballot at any time. The touch-screen navigation options meet all applicable guidelines for text size and readability. The physical keypad has been designed and tested with significant contributions from special needs groups. The keys are arranged and shaped to provide an intuitive voting session. Braille and printed-text labels describe each key's function.

- Arrow keys are used to indicate up, down, left, and right.
- The square key serves as an "enter" key.
- The diamond-shaped key turns the screen on and off for audio only voting.
- The round key repeats the last audio prompt.
- Two sets of long oval keys control the volume and tempo of audio files.

Voters can easily change ballot selections by navigating back to the appropriate contest and selecting the change.

Full Support for Voters with Disabilities
The ES&S AutoMARK provides voters with vision and mobility disabilities the tools to privately cast a paper ballot.



AutoMARK navigation and audio controls

The terminal's zoom and high-contrast display options, audio ballot and Braille-embossed keypad provide full support for voters with vision impairments. An available port for a sip 'n' puff device, foot pedal, or other two-position switches facilitates unassisted voting for voters with mobility issues.

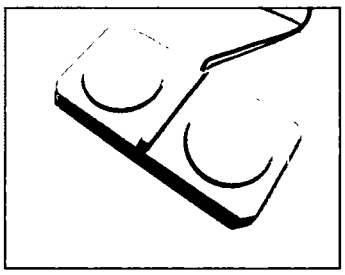
The ES&S AutoMARK records selections on the same paper ballot used by every voter at the polling place ensuring privacy and anonymity during ballot counting. The terminal is an assistive device that does not tabulate ballot selections.

The AutoMARK's zoom and high contrast display options provide assistance for voters with low vision. After a voter navigates a complete ballot, the terminal generates a summary of selections in display and audio formats that the voter must approve before marking the final ballot. This ballot summary provides the opportunity to review and edit selections before committing votes to paper.

Sip 'n' puff device

Voters who use the AutoMARK's display ballot select their options behind a standard privacy screen to prevent onlookers from viewing the ballot display.

Two-position foot pedal



Voters can touch the Zoom In/Out button on any screen to increase and decrease the size of the displayed text. Selecting the High Contrast option on any screen toggles the display between high contrast mode – white text on a black background – and normal contrast, which is color mode.

ES&S AutoMARK System Features and Benefits

Feature	Functionality	Benefit
HAVA-COMPLIANT PAPER BALLOT VOTING	• Multiple ballot navigation and selection methods including touch screen, Braille-embossed keypad, and optional AT devices (sip and puff tube, foot pedal or any other two-position switch). • Audio presentation in either synthesized speech or real voice .wav files. • Tempo and volume controls for adjusting audio ballot presentation. • Vibrant ballot display. • Ballot zoom and high-contrast (white text on black background) display options.	AutoMARK enables voters with vision and mobility issues to vote a paper ballot without assistance.
REAL-TIME PAPER TRAIL	• Marks conventional optical scan paper ballots. • Processes ballots cast by disabled voters at the same time and in the same manner as all other ballots cast on Election Day.	AutoMARK is the only HAVA-compliant system that outputs the same paper ballots cast by hand at the polling place.
PRIVACY AND ACCURACY	• Option to blank the screen during audio voting clears the terminal display to prevent onlookers from viewing ballot selections. • Physical privacy screen shields the AutoMARK display during voting. • Optional ballot privacy sleeve may be used to transport the paper ballot from the ballot-marking terminal to the polling place tabulator or ballot box without revealing selections. • Marked ballots inserted into the terminal generate an audio and display ballot summary to confirm that ballot selections were marked as intended prior to casting.	AutoMARK ensures private ballot casting for all voters.
SUMMARY PAGE ACCURACY	• Audio and display ballot summary allows voters to review and modify ballot selections prior to marking a paper ballot. • AutoMARK ensures that voters cannot select more than the allowed number of candidates or ballot options for a contest.	AutoMARK eliminates over-voting and greatly reduces the risk of under-voting. The ballot summary prevents voters from mistakenly selecting unwanted candidates or ballot options.

Feature	Functionality	Benefit
ALTERNATIVE LANGUAGE SUPPORT	• Multiple languages can be stored on a single machine for use with both audio and visual ballots. Audio presented in text to speech converted or real voice .wav recordings. • The AutoMARK is language agnostic and is only limited by the languages supported in ElectionWare. The election definition files contained on the CF card determines the languages that are visually and audibly supported. Audio support is conducted by the use of WAV files which can be created using human recorded speech or through text to speech converters used as a tool for WAV file creation. ElectionWare supports file exports and imports to facilitate getting text translations and audio files into its database for used in creating the election definition for the AutoMARK. • .wav files support all languages.	AutoMARK ensures that citizens in a diverse population are free to exercise their privilege to vote unassisted in their native language.
ABSENTEE, EARLY AND PROVISIONAL VOTING	• Ballot program contains all ballots within a jurisdiction. • Provisional voting is supported. • Absentee voters can use the AutoMARK at pre-determined locations.	AutoMARK simplifies the process of providing HAVA-compliant advance, absentee and provisional voting jurisdiction-wide without changing existing optical scan equipment or procedures.
POLL OPENING AND CLOSING	• No special procedures required for opening and closing polls. • Audit logs provide operational information and time/date stamps for printed ballots.	AutoMARK is easily deployed at any standard polling station.

ES&S AutoMARK Technical Overview – Audio Subsystem

Type	• Stereo
Cord Length	• 6 feet
Connector	• ¼" and ½" (3.5mm) headphone jack
Expected life	• 10 years
Synthesized speech speed	• 0 – 250 words per minute

System Memory

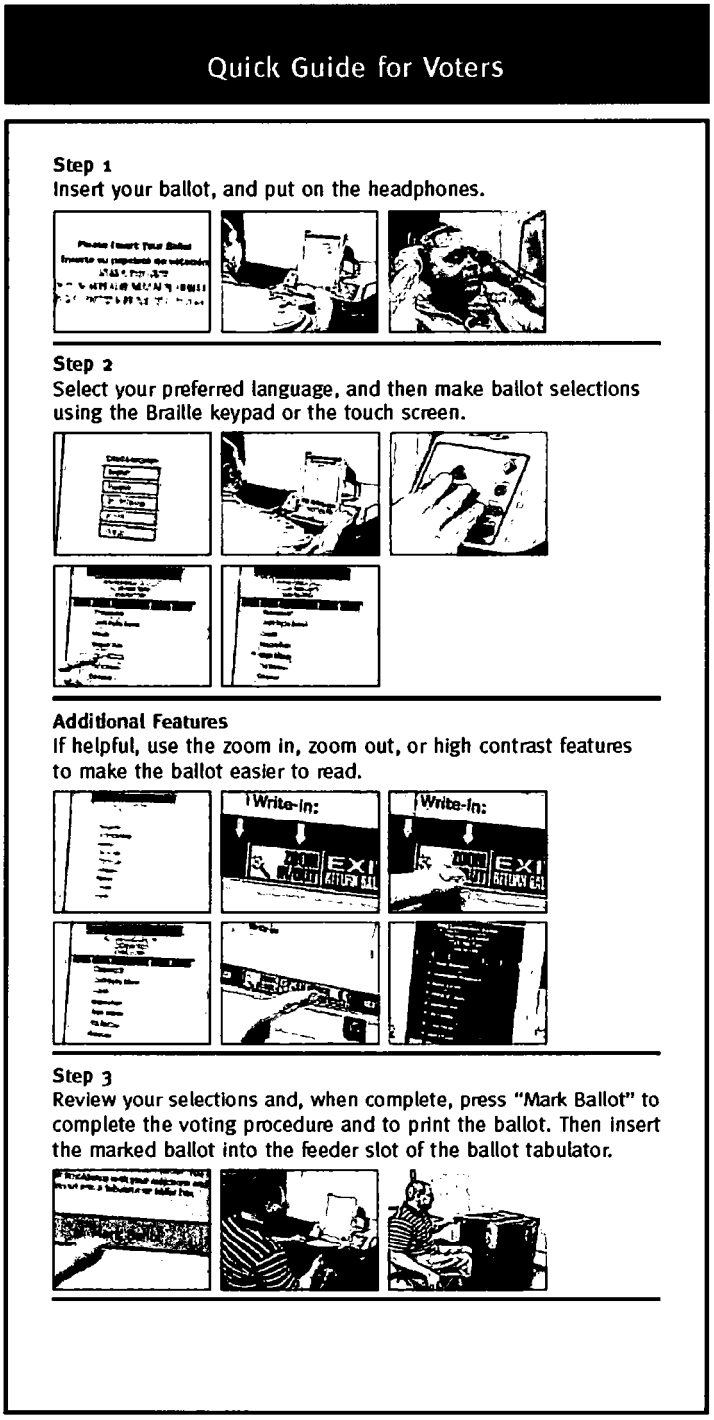
The AutoMARK's election configuration is stored to a standard flash memory card that is inserted behind a locking panel on the terminal's control pane. This card is removable, reusable, and interchangeable with other AutoMARK terminals.

The terminal's memory card contains all of the election data – contests, candidates, choices and setup instructions – required to emulate the jurisdiction's ballot either on screen or with terminal audio files.

Because the ES&S AutoMARK does not tabulate election totals, no results are stored to the terminal's flash memory card.

Privacy Screen
The ES&S AutoMARK privacy screen ensures voter privacy while marking a display ballot.

Marking a Ballot with AutoMARK



Quick Guide for Voters

Step 1
Insert your ballot, and put on the headphones.

Step 2
Select your preferred language, and then make ballot selections using the Braille keypad or the touch screen.

Additional Features
If helpful, use the zoom in, zoom out, or high contrast features to make the ballot easier to read.

Step 3
Review your selections and, when complete, press "Mark Ballot" to complete the voting procedure and to print the ballot. Then insert the marked ballot into the feeder slot of the ballot tabulator.

Question 2.19: Describe the user interface for Pinal County staff (diagnostic tests, warning messages, instructions, ballot test, logic & accuracy test, etc.)

ES&S RESPONSE

The ES&S AutoMARK touch screen is the main interface between the terminal and user. The touch screen displays all ballot contents, language and font selections, system messages, instructions, and terminal settings.

When a user touches a candidate name or target box on the screen, the choice highlights to indicate a valid selection. Touching the same box or area a second time cancels the selection. After a ballot is cast using the AutoMARK, the ballot can either be automatically submitted to an AutoCAST ballot box specifically designed for the AutoMARK or the ballot can be returned to the voter for review before it is cast into the same ballot box used by other voters.

In addition to the user interface, language can be presented in an audio format that a user listens to through headphones. These headphones have low sound leakage to preserve privacy.

Key features of the AutoMARK audio presentation include:

- Audio presentation in either real voice or text-to-speech created .wav files.
- Tempo and volume controls for adjusting the presentation of the audio ballot.

Multiple accessibility tools can be provided for voters with special needs. These include the AutoMARK device's Braille-embossed keypad, and optional AT devices like, sip 'n' puff tube, rocker foot pedal, or any other two-position switch. Ballot secrecy sleeves can help ensure privacy while casting a ballot.

The AutoMARK can scan the printed ballot and play an audio summary of the ballot for a sight-disabled voter to review.

AutoMARK pre-election setup procedures are detailed in the System Operator's Manual. Preparing the ES&S AutoMARK is easy and requires the following steps, as a minimum:

- Connect AC power.
- Install the election definition on the compact flash card.
- Install the ink cartridge.
- Conduct a print test (fills all oval positions on the test ballot).
- Test the touch-screen interface and functionality of accessibility devices.
- Use a test script to mark ballots that are representative of all ballot styles on the AutoMARK compact flash card and then verify that the terminal is properly marking the ballots in accordance with the scripted marking schema.

The AutoMARK's touch-screen monitor provides simple instructions and indicators for all users. The touch screen displays all ballot, language, and font selections as well as system messages, instructions, and terminal settings.

Each AutoMARK device has LED light indicators to determine when it is running on external power or battery. An alert message is also displayed on the voter-facing screen (and audio) if the battery level becomes low but will allow for the voter to complete their voting session. It also will display an alert message if the battery level gets to a very low state and will not allow for a voter to begin a session.

Calibration of the each AutoMARK device is normally conducted as part of the device setup for each election, but can be completed at the polling place if necessary to ensure voting accuracy. The system

will provide a series of prompts for the poll worker to touch various locations on the touch screen user interface to calibrate the system. The system does not produce a warning when calibration needs to be reset.

Question 2.20: Describe the user interface for voters, including detailed steps required by the voter to utilize the equipment and VVPAT. Document types of accessibility tools provided and/or available for voters to use.

ES&S RESPONSE

The ES&S AutoMARK touch screen is the main interface between the terminal and voter. The touch screen displays all ballot contents, language and font selections, system messages, instructions, and terminal settings.

When a voter touches a candidate name or target box on the screen, the choice highlights to indicate a valid selection. Touching the same box or area a second time cancels the selection. After a ballot is cast using the AutoMARK, the ballot can either be automatically submitted to an AutoCast ballot box specifically designed for the AutoMARK or the ballot can be returned to the voter for review before it is cast into the same ballot box used by other voters.

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The AutoMARK can scan the printed ballot and play an audio summary of the ballot for a sight-disabled voter to review.

Question 2.22: Document dimensions and weight of equipment.

ES&S RESPONSE

AutoMARK Physical Characteristics

Dimensions	**Operational** • **Width** – 20.8 inches • **Depth** – 26.0 inches • **Height** – 17.6 inches	**Closed** • **Width** – 20.8 inches • **Depth** – 26.0 inches • **Height** –7.5 Inches
	Case • **Width** – 26 inches • **Depth** – 34 inches • **Height** – 14 inches	
Weight	• 48 lbs. with internal battery; 47 lbs. without internal battery	

Memory	• **Type** – Compact flash 2 • **Memory type** – Flash • **Capacity** – 256MB
Display	• **Type** – TFT – resistive touch screen • **Diagonal size** – 15 inches • **Viewing area** – 8.9 inches x 11.9 inches • **Equivalent PC screen specification** – XGA • **Screen resolution** – 768 x 1024 • **Color depth** – 64k • **Display brightness** – ≥250

Question 2.26: Document types of automatic diagnostic tests available to run before polls are open and while polls are open.

ES&S RESPONSE

The AutoMARK automatically performs a series of diagnostic tests each time the system is activated. The results of these tests appear onscreen as each test concludes.

Election workers test the ballot-marking and mechanical subsystem by feeding blank test ballots through the unit, navigating contests, and selecting and manually recording onscreen selections from the ballot display and audio presentations. The resulting marked ballot is then compared to the expected selections to ensure that each ballot position is marked accurately.

Types of Tests

- **Power-on Self Test (POST) Diagnostic.** This motherboard test examines random-access memory (RAM) and peripherals. Like any other motherboard, the POST looks at the clock chip for the time. If the battery is dead, it loads the default time for the clock chip. The motherboard is built to have the battery last for 10 years.
- **Intensity Measurement.** Checks the function capabilities of the scanner.
- **Scanner Calibration.** Available on the System Maintenance menu.
- **Test Ballot Print.** Prints a candidate name on every oval location on the ballot. From this, election officials can determine if the printer needs to be calibrated.

Pre-Election Testing of the AutoMARK

Pre-election setup procedures are detailed in the system Operator's Manual. Preparing the AutoMARK is easy and requires the following steps, as a minimum:

1. Connect AC power.
2. Install the election definition on the compact flash card.
3. Install ink cartridge.
4. Conduct a print test (fills all oval positions on the test ballot).
5. Test the touch screen interface and ADA-compliant functionality of devices.
6. Use a test script to mark ballots that are representative of all ballot styles on the AutoMARK flash card and then verify that the terminal is properly marking the ballots in accordance with the scripted marking schema.

Question 2.29: Describe recommended user maintenance. Provide details of features included for efficiency in maintenance (e.g. units can be daisy-chained to charge, units can be charged with in carrying case, etc.).

ES&S RESPONSE

Clients can perform most AutoMARK preventative maintenance tasks with minimal training from ES&S, but only qualified ES&S technicians should perform some advanced maintenance activities. ES&S maintenance guidelines ensure that all personnel follow comprehensive, consistent and thorough maintenance procedures. ES&S requires that all jurisdiction maintenance personnel receive training from ES&S and read system maintenance manuals. The following maintenance items can be performed by Pinal County:

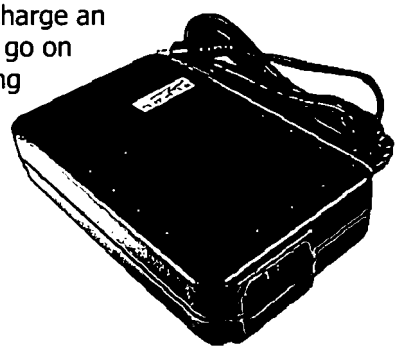
Pre-election maintenance

- Install new ink cartridge
- Charge the battery
- Install a correctly programmed Flash Memory Card
- Test with test ballots to ensure full functionality of the system

Post-election maintenance

- Install and remove the compact flash memory card
- Install a new ink cartridge
- Calibrate the printer
- Calibrate the scanner
- Remove the top cleanout area
- Install and remove the terminal cover
- Remove/install the diverter support assembly
- Open and close the input tray
- Clean CIS scan modules

Note: An optional external battery charger (pictured at right) can be purchased to charge an AutoMARK unit in its case, ensuring that that each unit will be charged and ready to go on Election Day. Batteries in the AutoMARK may be checked and charged without turning on the unit.



Our proposal recommends that ES&S provide hardware maintenance and software maintenance and support during the period of performance. ES&S will repair or replace any of our proprietary equipment or software that is defective in material or workmanship or otherwise fails to perform substantially in accordance with our documentation.

In addition, ES&S will provide preventative maintenance for our proprietary hardware during the period of performance. All upgrades, new releases, and maintenance patches for ES&S' proprietary software will be provided without additional charge during the period of performance (except for upgrades or new releases that are required due to changes in law).

Question 2.31: Document the type of reports available for printing directly from central count device site, including reports available prior to and following closing of polls on the device.

ES&S RESPONSE

There are five main types of reports that can be generated from the DS850 central scanner. The report types include:

- Zero Report
- Batch/Bin Report
- Precincts Processed Report
- Results Report
- System Readiness Report

Before ballots are scanned on the DS850, a Zero Report can be generated, which is a full results report that can only be generated when no ballots have been scanned. This provides a clear indication that the DS850 has been cleared for the election.

Once ballots have been scanned, Batch/Bin Reports are available for each output bin upon the saving of a batch. These Batch/Bin Reports can be set to automatically print a configurable number of copies and provide a summary level report of ballots processed and out stack reports that indicate all out-stack criteria that were met.

Before and during an election, a Precincts Processed Report is available. The Precincts Processed report allows you to see which precincts have been processed and which have not been processed. The options for this report are:

- **Precincts Processed** - The report contains a list of the precincts that have been processed and the ballot counts for each.
- **Precincts NOT Processed** - The report contains a list of the precincts that have not been processed.

When desired, a Results Reports can be generated for public reporting or with additional detail required by administrators at both an election level or at a polling location.

The Results Report contains detailed election results and is available in multiple report levels. The following are the report level options for the Results Report:

- **Election Detail** - The report displays detailed contest totals for the whole election.
- **Election Public** - The report displays contest totals for the whole election without including overvote and undervote information.
- **Precinct by Precinct Detail** - The report displays detailed contest totals for the selected precinct.
- **Precinct by Precinct Public** - The report displays contest totals for the selected precinct without including overvote and undervote information.

Finally, ES&S' Election Reporting Manager (ERM) is used to convert stored vote data from ES&S' DS850 central count scanner and tabulator into formatted election reports that can be printed or displayed on a monitor or County website.

Question 2.34: Document all expendables/consumables and types – printer paper, ink cartridges, memory media, battery, etc. – and if replacements are commercially available.

ES&S RESPONSE

The DS850 uses the following consumables, which can be purchased commercially or from ES&S:

Consumables Description	Availability
DS850 Consumables:	
Okidata B430DN Toner (Item #6826) - One (1) toner will last multiple elections. Recommend one (1) spare on-hand.	Included in DS850 Start-Up Kit.
ML420 Printer Ribbon (Item #RI-420) - One (1) ribbon will last multiple elections. Recommend one (1) spare on-hand.	Included in DS850 Start-Up Kit.
1-Part Printer Paper (Item #ES-PP1) - One (1) box will last multiple elections.	Included in DS850 Start-Up Kit.
8 1/2" x 11" Standard Printer Paper (500 sheets) - Two (2) reams of paper per election	One Ream Included in DS850 Start-Up Kit.
Touch Screen Cleaning Kit (Item #6500) - Will last multiple elections. Replace when cleaning rag is dirty.	Included in DS850 Start-Up Kit.
Alcohol Isopropyl (Item #ES-AL) - One (1) bottle will last multiple elections. Recommended one (1) spare on-hand.	Included in DS850 Start-Up Kit.
Compressed Air (Item #ES-AR) - Two (2) cans should last multiple elections. Recommend one (1) spare on-hand.	Included in DS850 Start-Up Kit.
UPS Battery Backup (Item #4779) - 3 to 5 year life depending upon usage	Included with DS850 unit.
Motherboard Battery - 6 to 10 year life depending upon usage	Included with DS850 unit.

The AutoMARK consumables are listed in the chart below:

AutoMARK Consumables:
Touch Screen Cleaning Kit (Item #6500) - Will last multiple elections. Replace when cleaning rag is dirty.
Ink Cartridge (Item #87002) - Minimum of one (1) per unit/per election. Dependent upon, among other factors, number of voters using the AutoMARK, size of ballot, number of marks per ballot, etc.
Ink Pad (Item #86016) - Can last multiple elections. Dependent upon, among other factors, number of voters using the AutoMARK, size of ballot, number of marks per ballot, etc.
Wire Roto 8" Seal (Item #86022) - Required if sealing the flashcard door. One (1) per election but recommend spares should access to the flashcard be required during the election.
Headset Ear Cover (Item #86003) - Dependent upon number of voters using the AutoMARK headset to cast their ballot.
Backup Battery- 3 to 5 year life depending upon usage
Motherboard Coin Cell Battery- 3 to 5 year life depending upon usage

2.35 Document included peripherals such as external printers, cases, tables, covers, etc. Document any optional equipment not included in Cost Proposal.

ES&S RESPONSE

The DS850 peripherals and accessories that are included in our proposal are listed in the following chart:

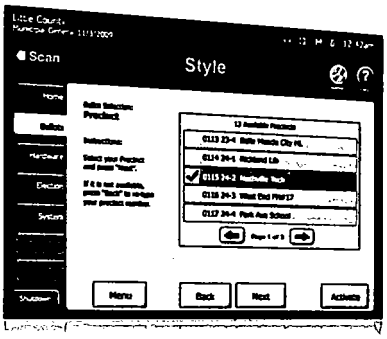
Description	Qty	ES&S Item #
Steel Table/Cart	1	6823
Dust Cover	1	6821
Reports Printer	1	6827
Audit Printer	1	4778
USB Cable	2	6101
UPS Battery Back-Up	1	4779
8GB USB Flash Drive	3	2397
DS850 Tool Kit	1	ES-TOOL

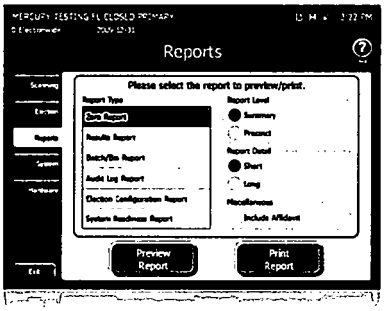
Start-Up Kit (Includes):	1	ES-SU1
8GB USB Flash Drive		2214
1-Part Printer Paper		ES-PP
Touch Screen Cleaning Kit		6500
Alcohol		ES-AL
Cloth		ES-Cloth
Canned Air		ES-AR
Audit Printer, Printer Ribbon		RI-420
Reports Printer Toner		6826
8 1/2 x 11 Paper		ES-PP
Firmware	1	/213075

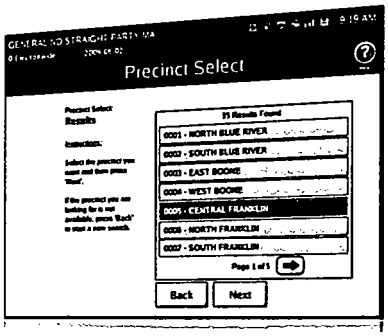
Question 2.36: Describe the user interface for Pinal County staff (e.g. diagnostic tests, warning messages, instructions, ballot test, logic & accuracy test, etc.)

ES&S RESPONSE

The DS850 features a user-friendly software interface on a 15-inch liquid-crystal display (LCD) color touch screen.







The screen's easy-to-use operator interface makes scanning as simple as placing the stack of ballots on the input hopper and pressing START. The DS850 can be completely configured using ES&S' ElectionWare software, which downloads the scanner's configuration settings as part of the digitally signed and encrypted election definition.

These settings also can be configured directly on the machine through access code-protected administration screens. Status and settings are clearly displayed on the large touch-screen display and the user interface prompts the operator at every step, greatly reducing learning time as well as questions and errors.

The DS850 user interface features five menus: Scanning, Election, Reports, System, and Hardware.

- **Scanning.** The Scanning menu is used to scan ballots and clear the ballot transport path.
- **Election.** The Election menu is used to load an election definition, view election setup information, export election results, and set scanner configuration options.

- **Reports.** The Reports menu is used to print and preview the following reports:
  - **Zero Report.** Ensures all contests have zero votes before ballots are scanned.
  - **Results Report.** Provides detailed election results in customizable multiple report levels.
  - **Batch/Bin Report.** Reports ballot totals for the last batch that was saved. Bin options are ballots Not Processed (top bin), Processes with Write-ins (middle bin), and Processed (bottom bin).
  - **Precincts Processed.** Reports on which precincts' ballots have and have not been processed.
  - **System Readiness.** Provides a descriptive list of system settings that can be used to verify that the DS850 is ready to begin ballot processing.
- **System.** The System menu is used to set the date and time, learn about the firmware version and other information, and review and set user access.
- **Hardware.** The Hardware menu is used to calibrate the DS850's touch screen, print test pages to the report and audit log printers, calibrate the DS850's camera and other camera settings, and set the DS850's ballot-transport settings.

Question 2.47: Describe in detail the steps required for Pinal County to setup and program Election Management System, including average estimate of time required.

ES&S RESPONSE

To create an election, the county will use the Electionware EMS. The following steps are required to build an election:

1. **Manage.** The Manage group is used to create necessary login information for users, jurisdictional nomenclature (precincts, districts, wards, etc.), jurisdiction information (such as state and county information), and other administrative tasks. **Estimated time: 1-3 hours.**
2. **Home.** The Home module is used to set up the initial election database. **Estimated time: 10-30 minutes.**
3. **Capture**. The Capture module is used to enter critical election information, such as district relations, race information, candidate information, party information, precinct and split information, race headings, and the generation of ballot styles. Through entering this information, the county is able to build the election databases necessary for ballot generation and coding. **Estimated time (depending on complexity): several hours to several days.**
4. **Element Library.** The Element Library module is used to set up system files (such as instructional screens and audio files) for assistive technology. Typically, this information only needs to be entered once with marginal changes necessary from election to election. **Estimated time: Initial setup can take 1 to 3 hours, with succeeding elections taking only minutes once the base information has been established.**
5. **Paper Ballot.** The Paper Ballot module is use to lay out and publish ballots. Using the ballot set information created in Capture, Paper Ballot provides the county with the base information for their ballots. Using options such as style sheets, frames, and graphics, the county can then set up the ballot in whichever manner they prefer. **Estimated time: Depending upon the complexity of the election, layout can take anywhere from a few hours to a few days.**
6. **Accessible Ballot.** The Accessible Ballot module is used to configure screen elements and audio for accessible equipment. Using this module, the Pinal County can change the look of screen elements, such as race titles, candidate names, and other election information. Additionally, audio elements relating to races and candidate names can be configured to match pronunciation information necessary for accessible voters. **Estimated time: Time in this module depends upon the method of recording used and the election's complexity. Times can range from a few hours to a number of days.**

7. **Configure Equipment.** The Configure Equipment module is where information is established for the tabulation unit. The configurations of these units depend upon local election statutes, but define how the tabulator stores information such as ballot images, printing reports, and handling of variable ballot entries such as write-in data and over-vote and under-vote scenarios. **Estimated time: 1-3 hours.**
8. **Package.** The Package module is where tabulator information is "burned" to election media, such as USB devices. **Estimated time: Time spent in this module depends upon how much media is created. Depending upon the amount of media created, time in this module can range from one to several hours.**
9. **Print.** The Print module is where ballot-on-demand (BOD) ballots are created. The module has the ability to print BOD ballots for proofing and voting needs. Once printer configurations are established, time in this module directly correlates with the number of ballots to be printed. **Estimated time: 1-3 hours.**

Question 2.51: Describe type, size and weight of ballot stock required for tabulation by system and if stock is commercially available.

ES&S RESPONSE

Ballot paper specifications for the ballot stock to be used by the DS850 system:

- **Grain Direction on Finished Ballot:** Long
- **Basis Weight:** 80# text weight (36.2874kg)
- **Thickness:** 0.0061 inches (0.015494cm)
- **Smoothness:** 130 Sheffields
- **Moisture:** 5.5 percent
- **Opacity:** 97.0
- **Brightness:** 92 to 94
- **Pages Per Inch (PPI):** 338

To ensure ballots are properly tabulated by the DS850 vote scanner and tabulator, ES&S recommends that Pinal County uses ES&S' proprietary CountRight™ Digital Ballot Stock or a stock with the same specifications.

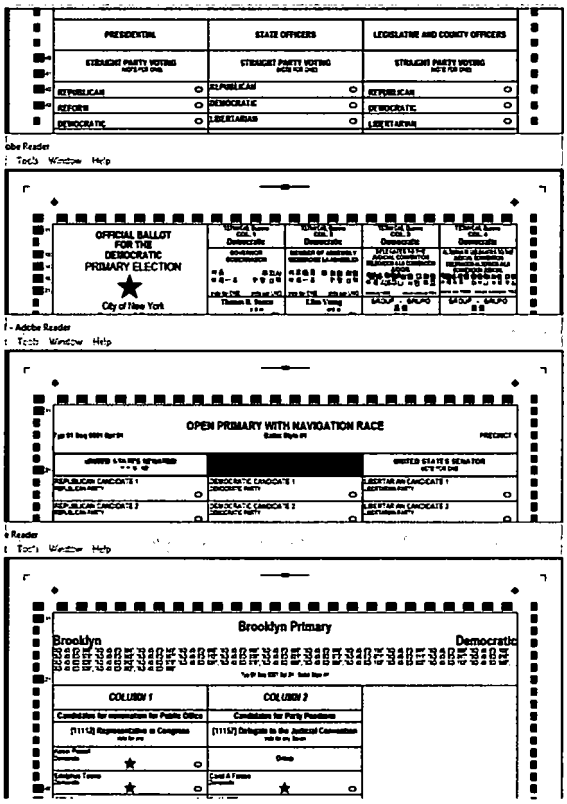
CountRight is available to the County's printer in two ways. First, as the only authorized distributor of CountRight ballot stock, Xpedx, North America's largest paper distributor, will offer CountRight parent sheets and rolls in a variety of sizes and formats to Pinal County. Second, ES&S stocks and markets CountRight Digital Ballot Stock in various sizes and formats. This pre-cut stock is blank with no pre-printing on it.

If the County desires to use blank ballot code stock other that ES&S' proprietary CountRight Digital Ballot Stock, ES&S recommends that the selected stock adhere to ES&S' ballot-code stock specifications with respect to size, weight, thickness, brightness, smoothness, moisture content, and opacity. Any deviation from ES&S' ballot code stock specifications may result in the ES&S DS850 scanners not accepting ballots printed with non-ES&S blank ballot stock.

Ballots with color. There are a variety of methods to enhance the color of ballots read by the DS850. Color stripes can be printed on the ballot for easy identification of ballot by the poll worker. Colors also can be used on the ballot for section identification by adding color to race headers and instruction blocks by using the image manager features of the ElectionWare Paper Ballot module.

Alternatively, ballots can be printed on colored stock. However, there are limitations on the colors of stock that may be used with the scanners. Specifically, yellow and green stock is easily read; blue stock is adequate; and red and orange stock cannot be read by the DS850.

Examples of possible use of color on the headers and instruction blocks is shown below:



Question 2.52: Describe the process required to add write-in candidates to ballot.

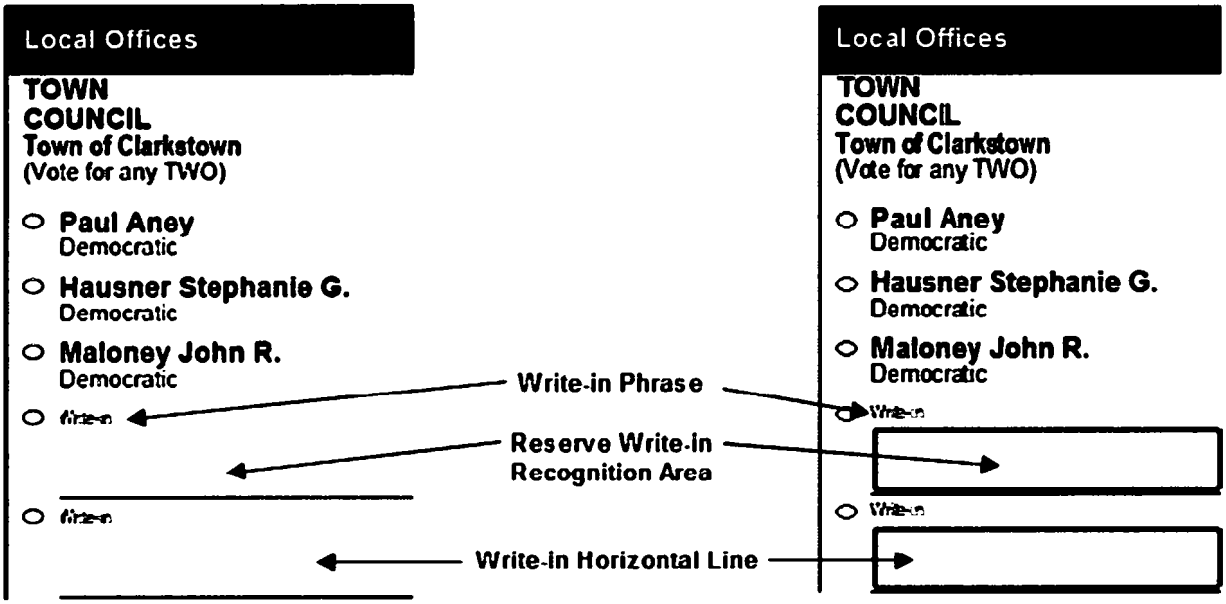
ES&S RESPONSE

The ElectionWare Paper Ballot feature allows an extended write-in area on these ballot layout types:

- Column with Portrait Orientation
- Grid with Portrait Orientation
- Grid with Landscape Orientation

The ElectionWare Extended Write-In module allows DS850 scanners to identify ballots with write-in votes without the associated ovals filled in, as well as filter and display the same by type ballot in ElectionWare.

The following image on the left is a printed ballot. The image on the right is what is seen in Paper Ballot when designing the ballot with the Extended Write-in feature. The reserve write-in area is indicated by a gray border while designing ballots in Paper Ballot. The gray border does not get printed.


Local Offices
TOWN COUNCIL
Town of Clarkstown
(Vote for any TWO)
Paul Aney
Democratic
Hausner Stephanie G.
Democratic
Maloney John R.
Democratic
Write-in Phrase
Reserve Write-in Recognition Area
Write-in Horizontal Line
Local Offices
TOWN COUNCIL
Town of Clarkstown
(Vote for any TWO)
Paul Aney
Democratic
Hausner Stephanie G.
Democratic
Maloney John R.
Democratic

Technology Questionnaire Supplemental Responses

Question 2.54: Describe your proposed system, how it works together and how it will interface with Pinal County's Voter Registration System. If possible, include a diagram of your proposed architecture.

ES&S Response

ES&S Voting System 5.0.0.0 (EVS 5000) provides a scalable, end-to-end election system for jurisdictions with widely varied requirements. For Pinal County, ES&S recommends the following EVS 5000 components for use with the County's existing equipment.

- **ElectionWare** Election Management System software for defining contents, candidates, and ballot formats and performing results post-processing.
- The **ES&S AutoMARK,** a proven ballot accessible marking system that supports audio, touch screen and tactile keypad inputs for ballot marking.
- The **DS850** digital scan central ballot counter for high speed tabulation of mail ballots, absentee ballots or Election Day ballots. Jurisdictions can network multiple DS850 scanners to a central reporting PC for large central count operations. Capable of scanning/tabulating both electronically marked paper ballots and manually marked paper ballots.
- **Election Reporting Manager (ERM)** software for results consolidation and report generation.

The EVS 5000 system components, diagrammed in Appendix B, that are recommended for Pinal County are divided into the following functional groups:

- Election Management System (EMS)
  - ES&S ElectionWare
  - ES&S Election Reporting Manager
- Optical Scanner/Central Count
  - ES&S DS850
- Accessible Voting Equipment
  - ES&S AutoMARK Voter Assist Terminal (VAT)

These components will interface seamlessly with Pinal County's existing equipment:

- Voter Registration System
  - ES&S Power Profile v12.4

When our future voting system, EVS 5200, is certified (projected for summer of 2014), Pinal County may consider migrating to this system to take advantage of the **ES&S ExpressVote Universal Voting System** that enables voters to vote any ballot in the jurisdiction without the need for paper ballots. The ExpressVote creates a verifiable paper record by printing a human- and machine-readable ballot summary card to be tabulated in the DS850.

Standalone or Closed Network

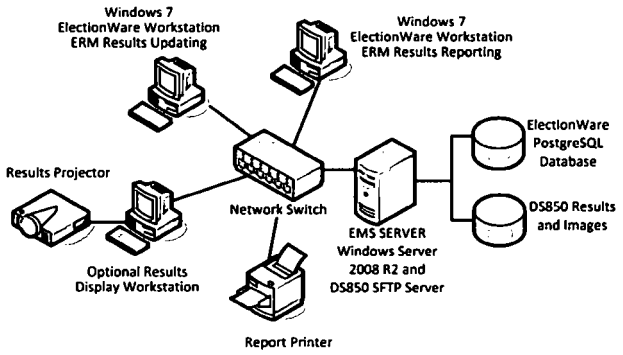
The EVS 5000 voting system supports the following system configurations:

- Standalone system: Microsoft Windows 7-based PC setup for full election support. Each computer configuration is a single, stand-alone, EMS workstation used for election preparation and reporting.
- Windows Server EMS Network: Networked system that combines a Client/Server (Microsoft Windows 2008 Server) setup to support one or more client EMS Workstations with an optional results network for DS850 central ballot scanners.

Optional Windows Server EMS Network

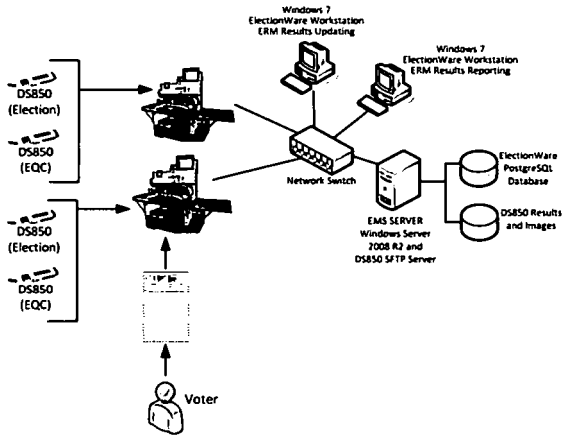
The EMS network is the base of the proposed technology architecture. The EMS network is designed around the concept of a closed-loop local-area network (LAN). In isolation, it would not be connected to the Internet or any other internal network. The EMS system includes a Windows 2008 R2 server and Windows 7 Professional workstations. The workstations can be either desktop or laptop computers. The workstations are then connected to the server using a gigabit switch.

The DS850s can be connected to the EMS network via an SFTP Server hosted on the EMS Server. Each DS850 is given a unique User ID and Password. The SFTP Server is set up so that the DS850-transmitted data is stored directly into the proper election data folder on the EMS Server. All physical connections to the network are standard, physical, network connections.



Optional DS850 Reporting Network

Multiple DS850 tabulators can be networked to a central reporting PC for high-speed mass ballot counting and results consolidation. This local reporting network has no connections to the Internet or outside data lines.



Question 2.55: Provide a list of technological specifications that will need to be provided by Pinal County. This should take into account network bandwidth, servers (e.g. web, application, data, content management), user base and all recommended software.

ES&S RESPONSE

Technological specifications for hardware and software that will be required by Pinal County for the proposed solution are contained within the response to **Question 2.61**.

Question 2.57: Describe the data backup procedures including storage method options.

ES&S RESPONSE

Product	Backup And Recovery Features
ElectionWare (EVS 5000 and 5200)	ElectionWare uses an integral PostgreSQL database to store all election data in encrypted form. The elections may be backed up and restored using menu items in ElectionWare. The database resides locally on the Windows 7-based computer. If a Windows 2008 server is used in the configuration, you have the option of locating the database on the server. In either case, further backups of the entire PostgreSQL database may be made using standard Windows file management methods.
AutoMARK (EVS 5000)	The AutoMARK is a ballot-marking device that only prints vote selections on an inserted paper ballot. Its primary use is for voters with disabilities. It does not tabulate or record votes. There is no data to back up. All log information is saved on the removable Compact Flash memory card. The card can be moved to a backup unit, if required.
DS850 (Optional) (EVS 5000 and 5200)	During scanning, ballot data is collected in RAM and, upon completion of the run, the ballot data is stored to a temporary folder on the internal hard disk drive. In the event of a shutdown event, the machine can be powered up and operation resumed from the point before the shutdown. When the operator chooses to save a batch, the ballot data is moved from the temporary location and stored in a saved folder where the data is marked as available for aggregation. The DS850 uses an uninterruptable power supply (UPS) to allow a run to complete and the unit to be shutdown in a controlled manner by the user action or automatically before power is lost. Vote data can be backed up to a stick from which a results collection can be done in the case of a hardware failure.
Election Reporting Manager (EVS 5000 and 5200)	Election Reporting Manager (ERM) backs up the election data in its own database when the flash drive data is read into this application. The jurisdiction may also further back up the data by copying the database files to a storage device of their choosing using Windows File Manager. Instructions can be found in the operators guide.

Product	Backup And Recovery Features
ExpressVote (EVS 5200)	The ExpressVote prints human- and machine-readable ballot summary cards that can be tabulated on a DS800. It does not tabulate or record votes. There is no data to backup. All log information is saved on the removable USB flash drive. The USB flash drive can be moved to a backup unit, if required.

Question 2.61: Provide a Federal certification list of all application and operating system software and versions used and/or supported as well as the recommended software and versions for any components that will be deployed in or integrated with any Pinal County infrastructure or applications.

ES&S RESPONSE

Product	SW/FW Version	Manufacturer	Description
EMS Workstation – Desktop or Notebook	**N/A**	**N/A**	**PC workstation for standalone use or the Windows 2008 Server environment.**
Required Software			**Required for all EMS components**
Windows	Windows 7 Professional, 64-bit, SP-1	Microsoft	- Operating System
AVG Business	2012	AVG	- Anti-virus
Removable Media Service (RMS)	1.4.0.0	ES&S	- Supports graceful installation and removal of results media
ES&S Event Log Service (ELS)	1.5.0.0	ES&S	- Provides custom event log reports from the Windows Event Log
ElectionWare - Client	**4.1.0.0**	**ES&S**	**Election database, ballot and election equipment configuration**
VAT Preview	1.8.1.0	ES&S	- Required for configurations including AutoMARK
PaperBallot	3.1.0.0	ES&S	
Adobe Acrobat Standard[1]	9.0	Adobe	- Ballot PDF generation
Election Reporting	**8.6.0.0**	**ES&S**	**Election results report**

Product	SW/FW Version	Manufacturer	Description
Manager			**management**
RMCOBOL	12.06	Liant	- COBOL Runtime
Hardware			
Processor	N/A	N/A	- Dual Core
RAM	N/A	N/A	- 2 GB minimum, 4 GB recommended
Hard Disk	N/A	N/A	- 150 GB
Keyboard	N/A	N/A	- N/A
Mouse	N/A	N/A	- N/A
Monitor	N/A	N/A	- 1280x800 minimum resolution
CD/DVD reader	N/A	N/A	- 16x or faster
USB Ports	N/A	N/A	- Minimum 2 USB 2.0 ports
Report Printer	N/A	N/A	- Standard Printer
Windows Workstation	**N/A**	**N/A**	**Non-certified business PC**
Microsoft Excel[2]	2007 or better	Microsoft	- Spreadsheet Software
Windows 2008 EMS Server	**N/A**	**N/A**	**Server for Windows 2008 Server network environment**
Required Software			Required for all EMS components
Windows	2008 Server Standard EditionR2, SP-2	Microsoft	- Operating System – acquired from OEM or directly from Microsoft
AVG Business	2012	AVG	- Anti-virus
Electionware - Server	4.1.0.0	ES&S	Ballot and election equipment configuration
Optional DS850 Results Network Software			Results Server for Windows 2008 Server network environment. Runs on the same physical server as the Windows 2008 EMS network server and requires all software listed for the Windows 2008 Server.
Cerberus FTP	4.0	Cerberus LLC	- Secure, FTP server
Hardware			-
Processor	N/A	N/A	- Quad Core

Product	SW/FW Version	Manufacturer	Description
RAM	N/A	N/A	- 4 GB minimum
Hard Disk	N/A	N/A	- 320 GB
Keyboard	N/A	N/A	- N/A
Mouse	N/A	N/A	- N/A
Monitor	N/A	N/A	- 1280x800 minimum
CD/DVD reader	N/A	N/A	- 16x or faster
USB Ports	N/A	N/A	- Minimum 2 USB 2.0 ports
Ethernet Port	N/A	N/A	- N/A
Report Printer	N/A	N/A	- Standard Network Printer
DS850	**N/A**	**N/A**	**Central vote tabulator**
System Firmware	2.4.0.0	ES&S	Application firmware for precinct-based vote tabulation
System Hardware	1.0	ES&S	DS850 Voting System Hardware
Compact Flash Memory Card	N/A	Delkin	- Supported sizes include 1 GB
USB Memory Stick	N/A	Delkin	- Supported sizes include 512 MB, 1 GB, 2 GB, 4 GB, 8 GB
Report Printer	N/A	OKI	- B430dn Laser Report Printer
Audit Printer	N/A	OKI	- Microline 420 Dot Matrix Printer
ES&S AutoMARK	**N/A**	**N/A**	**VAT**
System Firmware	1.8.1.0	ES&S	Application firmware for HAVA-compliant ballot marking system
Printer Engine Board (PEB)	1.70	ES&S	- Board Level Firmware
Scanner Interface Board (SIB)	1.43	ES&S	- Board Level Firmware
Ultra	8.0.1	ES&S	- Board Level Firmware
WinCE	5.00.20	Microsoft	- Operating System
System Hardware	1.0	ES&S	Hardware revision for AutoMARK model A-100-00
	1.1	ES&S	Hardware revision for AutoMARK model A-200-00
	1.3	ES&S	Hardware revision for AutoMARK model A-300-00
Compact Flash Memory Card	N/A	SanDisk/Toshiba	- Supported sizes include 512 KB, 1 GB, 2 GB

Product	SW/FW Version	Manufacturer	Description
Headphones	N/A	AVID	- Stock Headphones

[1]Acquired from OEM or licensed dealer.
[2]Acquired from OEM or licensed dealer.

Question 2.70: Describe details related to how security and access control management is implemented across the various aspects of the solution for internal and external security.

ES&S Response

Security is achieved through conformance to VVSG 2005 Standards, integrated warning and alerts; user roles; and data encryption and digital signatures.

No voter information is stored to the voting system software, ensuring voter privacy and security.

EMS – ElectionWare

ElectionWare incorporates the very latest in election security, including heightened audit controls and change management processes that are built in to make sure your election data is safe and secure.

- ElectionWare requires users to enter a valid username and password prior to gaining access to the application. The username and passwords are stored in an encrypted database. Strong password methodology is utilized which requires the password to be at least 8 characters long and include at least one number, one upper case letter, one lower case letter and contain no spaces.
- The system administrator creates unique user IDs for each user allowed to log onto EMS workstations. Election personnel allowed access to the shared folder on the server receive a second unique share user ID and password. Users are assigned to user groups on the Windows server and workstations based on roles:
    - ElectAdmin – Election administrators
    - ElectDefine – Election personnel responsible for coding the elections
    - ElectResult – Election personnel responsible for election results processing
    - Shares – Election personnel allowed to access the shared folder on the server
    - Shutdown – Election administrators allowed to shut down the system
- Depending on a user's access rights, ElectionWare limits selections in the Manage module. Unavailable menu selections do not appear in the application interface.
- ElectionWare saves a record of all user actions with username to the system audit log.
- System security for ElectionWare limits casual access to system files but security also depends on sound practices at the election office. Officials are required to implement a strong physical and procedural security plan that limits access to ElectionWare to authorized personnel only. Election officials should also make sure that the PCs running ElectionWare remain secure before and after each election.
- ElectionWare does not offer any data entry feature that can be used to alter programming.
- The database data directory is only accessible by the operating system administrator group and not by the regular user role.
- The database server accesses data through a service account, protecting data files from direct access.

- On the ElectionWare database server:
  - All security access codes and SFTP user passwords are stored using AES encryption using an election specific AES key.
  - Using system hardening scripts the Postgres data directories are protected from users and are accessed only by the non-admin Postgres service user account.
  - The final access permissions for a shared resource are determined by considering both the NTFS permissions and the sharing protocol permissions, and then applying the more restrictive permissions.
  - The SFTP user account passwords are exported to the SFTP server in an XML and all the passwords are stored as SHA-256 hashes in the XML.
  - The security access codes setup in Electionware is sent to the tabulators on a Qualification Media in the form of SHA-256 hashes.
  - During election creation, a unique FIPS RNG generated AES key and an election specific Public/Private key pair are generated. The election definition sent to the devices on the Election Media is encrypted using a password based derived key of the Election Access Code and signed by the election specific private key.
  - The election-specific AES key sent to the tabulators on the Qualification Media is used to encrypt data from the tabulators to the EMS. In addition to encryption, all encrypted data is further signed using a machine-specific private key generated during the Qualification process on the tabulator. The incoming Election Media containing results are first sign-verified to ensure authenticity and then decrypted for results accumulation.

Tabulator – DS850

From concept to construction, ES&S adheres to industry-leading standards for quality and security. Designed and federally certified to meet the rigorous security standards of the 2005 Voluntary Voting System Guidelines, the DS850 operating system controls, limits and detects unauthorized access to all critical system components. The system also implements state-of-the-art safeguards against losses of system integrity, availability, confidentiality and accountability.

DS850 security features ensure the highest level of physical and system-level security for the central count environment:

- **Data and system validation.** The DS850 provides easy validation for all resident firmware against certified versions and generates detailed audit and event logs to support system vetting. In addition, it validates and accepts only data that contains the proper digital data encryption and signing.
- **Strong physical access controls.** The DS850 secures all data ports behind clear plastic lockable and sealable access doors to protect access and allow election officials to easily detect unauthorized access. All critical hardware components can be locked and sealed as well. The DS850 logs when the imaging heads are accessed. It provides additional alerts and logs access to the back service door.
- **Role-based access codes.** The DS850 provides access codes that allow access for operator and administrative roles. Access code protection is configurable to protect all operations of the applications. Pass codes are required to access all critical functions, including Election Administration, Processing Modes, System and Hardware Maintenance, and Results functions. Supervisor functions are limited to the controls provided in the system menus.
- **Full logging for complete auditability.** The DS850 provides options for both real-time printed and electronic logging of all activity performed, with the ability to reprint logs on demand or export electronic logs for complete review. The DS850 logs all pass code attempts, whether successful or failed, to the digitally signed audit log. In addition, all user actions (such as administrative selections and open and close poll events), whether successful or failed, are written to the audit log. Only the DS850 system can create, read, modify, and delete the audit

log/inventory as the user interface is locked out of this functionality. All low-level access to the file systems is protected.

- **Digital encryption and signing of key files.** The DS850 uses digital encryption and signing of key configuration and data files for complete integrity of the election and results. All DS850 data is signed with FIPS-compliant digital signature algorithms. All data generated is also signed so the program receiving the data can validate it.
- **Protection against improper configuration.** The system functions will not execute if improperly configured.
- **Redundancy.** The DS850 requires the retention of paper ballots and proper election procedures by election officials as a redundant means of providing system security
- **DS850 network security.** Each DS850 tabulator is assigned a unique user ID and password on the SFTP Server.
- **Cast Vote Record security.** Cast Vote Records (CVRs) can be written to election media for backup purposes without aggregating vote data for reporting purposes. This prevents data from being read into the EMS system for the purposes of reporting. The aggregation of data is access-code controlled and can be locked out until re-enabled by an administrator.

ES&S AutoMARK

- **Access controls.** The operating software provides security access controls to limit or detect access to critical system components and to guard against loss of system integrity, availability, confidentiality, and accountability. When AutoMARK is started, data is decrypted against a PIN entered by the jurisdiction. If any files have changed, the system will alert the user and will not continue until the issue is resolved.
- **System function protection.** System functions are only executable in the manner and order intended, and only under the intended conditions.
- **Control logic.** Control logic prevents ballot marking if any preconditions to this function have not been met.
- **Tamper protection.** Hardware is designed to protect against tampering during system repair, or interventions in system operations in response to system failure. The data card compartment is key-locked and has a place for the County to add a tamper-evident seal. All data is protected with a secure hash code. All ports, doors, openings and data access points are protected by lockable, sealable clear plastic doors to protect access and allow election officials to easily detect unauthorized access.
- **System access limited.** System access during equipment preparation, testing, and operation is limited by access code.
- **Security safeguard protection.** Security safeguards cannot be bypassed or deactivated during system installation or operation by the user.
- **Logs.** The AutoMARK has three audit logs: Operations, Scanner, and Service. The Operations log keeps track of all voter operations. The Scanner log tracks problems reported by scanners. The Service log tracks any unit hardware failures. Logs are stored on the same compact flash memory card used to load election data on the AutoMARK. The logs are accessed through the service menu and can either be displayed or printed on ballot card stock. The logs are encoded and must use the AutoMARK firmware to translate them into displayable or printable form.

ES&S Event Log Service

- ES&S Event Log Service logs user actions for election management applications.
- ES&S Event Log Service runs in the background logging system events to the COTS Windows Event Viewer.
- Election officials use ES&S Event Log Service to monitor system activity.

- ES&S Event Log Service records all user actions in supported software as a continuous audit log. Election officials can format and print reports based on the log.

Election Reporting Manager

- Election Reporting Manager saves a record of all significant user actions to the ERM system audit log and also writes all audit log entries to the secure Windows Event Log.
- The aggregation of data is access-code controlled and can be locked out until re-enabled by an administrator.
- Access to the ERM application is controlled by the System Administrator assigned access rights as documented in the ES&S System Security and System Hardening documents.
- System security for Election Reporting Manager limits access to system files and election results but system security also depends on sound practices at the election office. Officials should limit access to Reporting Manager and election results to authorized personnel only. Election officials should also make sure that the PC running Reporting Manager remains secure before and after each election. Access to election results generated in Reporting Manager should be regulated and officials should compare election reports generated in Reporting Manager to scanner totals in order to make sure that final results are consistent with the results from ballot scanning equipment.
- Officials should retain all paper ballots and election results USB Memory Devices to ensure system security and provide audit trail for forensic investigation.

Question 2.89: Describe your approach related to deploying the application components for a) high availability (business continuity) and b) disaster recovery in general and in particular related to site loss

ES&S Response

All the components of the EVS system will be deployed on Pinal County's systems. While EVS was not certified with high-availability options configured, the EMS server and database server can be set up for high availability by adding additional servers. Postgres supports options such as master-slave failover using synchronous/asynchronous streaming replication.

At this time, ES&S does not offer archival services for site loss recovery. ES&S recommends that Pinal County take an image of servers and client machines after the system has been installed. It is also recommended that the election database be periodically backed up (the backup interval depends on election activity) and archived off site.

AutoMARK

The AutoMARK is a ballot-marking device that prints vote selections on an inserted paper ballot. Its primary use is for voters with disabilities. It does not tabulate or record votes. Therefore, there is no data to back up. All operations log information is saved on the removable Compact Flash memory card. The card can be moved to a backup unit, if required.

ExpressVote Universal Voting System (Future EVS 5200 system)

The AutoMARK is a ballot summary card marking device that prints vote selections on an inserted card. It is an ADA device for voters with disabilities and for any voter. It does not currently tabulate or record votes, therefore there is no data to backup. All log information is saved on the removable media device. The media device can be moved to a backup unit if required.

DS850

During scanning, ballot data is collected in RAM and upon completion of the run, the ballot data is stored to a temporary folder on the internal hard disk drive. In the event of a shutdown event, the machine can be powered up and operation resumed from the point before the shutdown. When the operator chooses to save a batch, the ballot data is moved from the temporary location and stored in a saved folder where the data is marked as available for aggregation. The DS850 uses an uninterruptable power supply (UPS) to allow a run to complete and the unit to be shutdown in a controlled manner by the user action or automatically before power is lost.

Vote data can be backed up to a stick from which a results collection can be done in the case of a hardware failure.

ElectionWare

ElectionWare has a true backup and recovery system built into the Home module. From the Navigator window, the user can right-click an election (unopened election) and backup the election to a location of their choosing. To restore the election, the user need only select it from a list of backed up elections and click Restore. The only item the user needs is the backup code that they used to backup the election originally.

Election Reporting Manager (ERM) backs up the election data in its own database when the flash drive data is read into this application. The County may also further back up the data by copying the database files to a storage device of its choice using Windows File Manager. Instructions can be found in the ERM Operator's Guide.

b) Disaster Recovery

Disaster recovery for the ES&S election setup and tabulation software applications should be consistent with the disaster recovery plan for the other mission-critical data applications used by the County's IT department. This should include offsite backup storage and the possible availability of offsite systems that contain the applications or can be quickly configured with the applications from previously prepared system images. The availability of high-speed data links would provide for electronic processes and eliminate the need for manual handling and control.

Should the DS850 experience a media failure, the election administrator would rescan the ballots. In the event of a device failure, data checkpoints are taken at the end of every cast ballot so that a new device can be brought up and media from the original device can be placed into it, allowing voting to restart at the point of the last cast ballot's completion.

ES&S will work with the County to determine the best methods for backing up the data, as well as a tailoring a disaster recovery plan according to industry best practices and County guidelines.

Question 2.92: Describe your proven solutions for maintenance of the application and options for Service Level Agreements.

ES&S RESPONSE

ES&S designs all voting system equipment for ease of preventative and corrective maintenance. All ES&S tabulators meet or exceed EAC maintainability requirements.

- **Mean Time to Repair:** The Mean Time to Repair (MTTR) measures the average time required to perform a corrective maintenance task. Corrective maintenance task time measures only active repair time and excludes logistic or administrative delays. Corrective maintenance may require on site repair. The mean-time to repair ES&S systems and components is sufficient, in combination with the Mean Time Before Failure (MTBF), to achieve the required availability.

- **Maximum Repair Time (MMAX):** ES&S designs central scanners and precinct equipment to provide a less than a 5 percent probability that an unscheduled maintenance action will require more than 30 minutes to complete. If a technician cannot repair a component in less than 30 minutes, a replacement component is placed on standby near ES&S scanners during the equipment's operating period.
- **Maintenance Ratio (MR):** Maintenance Ratio is the ratio of total maintenance hours (MH) to total operating hours (OH). MH is equal to the sum of the scheduled and unscheduled maintenance hours spent on all components that make up the system. OH includes the nominal time of system operation, including the time required to prepare the system for an election and the time required for post-election operations. The target maintenance ratio for ES&S systems is 0.25 MH/OH.

Hardware Extended Maintenance Warranty Packages
After the initial Warranty period, ES&S offers three hardware extended maintenance warranty packages available to Pinal County. Each of the plans provides different levels of preventative, corrective, and remedial maintenance services. A description of each of the packages follows:

Gold Maintenance Program: Under the Gold plan, ES&S provides a routine preventative maintenance service event each year. Our Gold Maintenance Program provides extended coverage for phone support, parts, on-site repairs, and an annual visit for preventive maintenance. Our ES&S service technicians carry diagnostic programs, specialized tools, an ample inventory of certified spare parts, and test ballots allowing them to service and test the product according to the hardware specifications and the maintenance agreement. Under this maintenance plan, hardware repairs are covered when failures are considered to be system related.

The annual routine preventative maintenance service event includes the cleaning and lubrication of each unit of equipment and all labor and parts (except consumables items such as printer cartridges, paper rolls, batteries, removable memory devices, or marking instruments).

Silver Maintenance Program: Includes the same core features offered with the Gold Maintenance Plan, with the difference being a one routine preventative maintenance service event during a two-year period (instead of a one-year period).

Core features for both the Gold and Silver coverage plans include the use of certified replacement parts, technical help desk support, priority status for repair services, software and firmware upgrades, repairs by trained and certified technicians, and one annual invoice that provides budgeting peace of mind.

Bronze Maintenance Program: Provides for remedial maintenance services that are performed at ES&S' Omaha, Nebraska, depot location unless such remedial services are required for 10 or more products at any given time. In the latter case, the locality may elect to have such services provided at its designated location. Under ES&S' Bronze coverage plan, the county is billed annually with a single invoice. In addition, there is no routine preventative maintenance service events associated with the Bronze Package; however, anytime maintenance is provided to a given piece of equipment, a hardware preventative maintenance inspection will be conducted by the technician.

Both during the warranty period and so long as the County maintains a hardware and software maintenance and support agreement with ES&S, the County will have access to the ES&S Help Desk support. The ES&S Help Desk is available to the County to answer any questions or issues which may arise with the use of ES&S' proprietary hardware or software.

Question 2.93: Provide overall critical success factors for Pinal County's technology staff to ensure deployment success. What skills/tools/support does Pinal County need?

ES&S Response

The most critical success factor for transitioning to the new voting system will be training. ES&S is prepared to provide that training to your election staff and County Trainers to make the transition to the new voting system almost effortless. To ensure that our users can maximize their understanding of the system, ES&S enhances usability and accessibility through heuristic evaluation, intelligent system design, comprehensive training programs, and administrative support services.

Pinal County will require basic IT components and technical support for the implementation and ongoing operation of the voting system. The support will be very similar to the requirements of the current voting system. Poll workers will have an easy time transitioning to their new duties with the elimination of the precinct tabulator from the polling locations. They will need to learn to interface with the functionality of the AutoMARK when used by the disabled voting community; however, the AutoMARK requires very little training for the poll worker with regards to setup or operation of the device.

Basic central count tabulator operations for machine operators for the DS850 scanners can be trained in less than one day. Its intuitive operation is easy to learn and the large, easy to read display will allow the machine operator to gain central count operation and reporting skills rapidly.

Learning election results accumulation software (Election Reporting Manager-ERM) will require a slightly more advanced technical skill set and require 4 hours of software training to gain the necessary skills to load DS850 results into the software application and learn to print different reports for your stakeholders. Users with previous experience operating results reporting software would require only two hours.

Performing ballot layout and programming will require additional technical software skills. These software skill requirements could be considered similar to the requirements to operate programs like Microsoft Word, Excel, or PowerPoint. ES&S recommends a five-day training course to cover all software modules, including ERM, and assure all of the various election scenarios specific to Pinal County are covered.

Counties looking for additional system functionality (automatic data backup, multiple simultaneous users, etc.) could choose a simple client/server or peer-to-peer configuration on a closed network. These systems require basic systems configuration skills to operate and maintain. ES&S, including the Technical Support Help Desk in Omaha, is staffed with resources trained specifically in the system that will be deployed to Pinal County and will be available to assist county in the system's operation.

Attachment 3
ES&S Responses-Hardware

Hardware Questionnaire Supplemental Responses

SOW # 2.1.1.3: EMS is a stand alone system, not connected to an external network, a public system, or the internet at any time. The EMS and components of the system may only be attached to other components inside of an isolated network.

ES&S Response

The ES&S voting system supports the following computer, system, and equipment configurations, which are not connected to an external network, public system, or the internet at any time. The EMS and components of the system are only attached to other components inside an isolated network:

Stand-alone System - Each Microsoft Windows 7 configuration is a single, dedicated Election Management System (EMS) workstation.

Peer-to-Peer Network - Closed-networked system using Microsoft Windows 7 that combines a peer-to-peer file server with two or more EMS workstations.

Multi-User Locally Networked Client Server - Closed-networked system with a Microsoft Windows 2008 Server set up to support two or more client EMS workstations with Microsoft Windows 7.

SOW # 2.2.1.1: Audit log of all actions taken on device is kept and accessible for printing.

ES&S Response

The DS850 audit log holds entries from all internal components capable of producing an audit log entry, including the power management board, the scanner hardware board, and the election processing firmware.

The audit log report lists all events (standard system messages, system errors, exceptions, operator actions, system responses to each operator action, etc.) that occur on the system from the time an election worker inserts the DS850's USB media device until the drive is removed. For example, the DS850 logs all pass code attempts, whether successful or failed, to the digitally signed audit log. In addition, all user actions (such as administrative selections and open and close poll events), whether successful or failed, are written to the audit log. Each event appears in the audit record with a date and time stamp.

Only the DS850 system can create, read, modify, and delete the audit log/inventory as the user interface is locked out of this functionality. All low-level access to the file systems is protected.

The DS850 comes equipped with a dot matrix printer to print the continuous audit log.

The EMS, ElectionWare, can be set to prevent the DS850 user from disabling audit log printing.

SOW # 2.2.2.3: System tolerates folded ballots at the same speed as flat ballots.

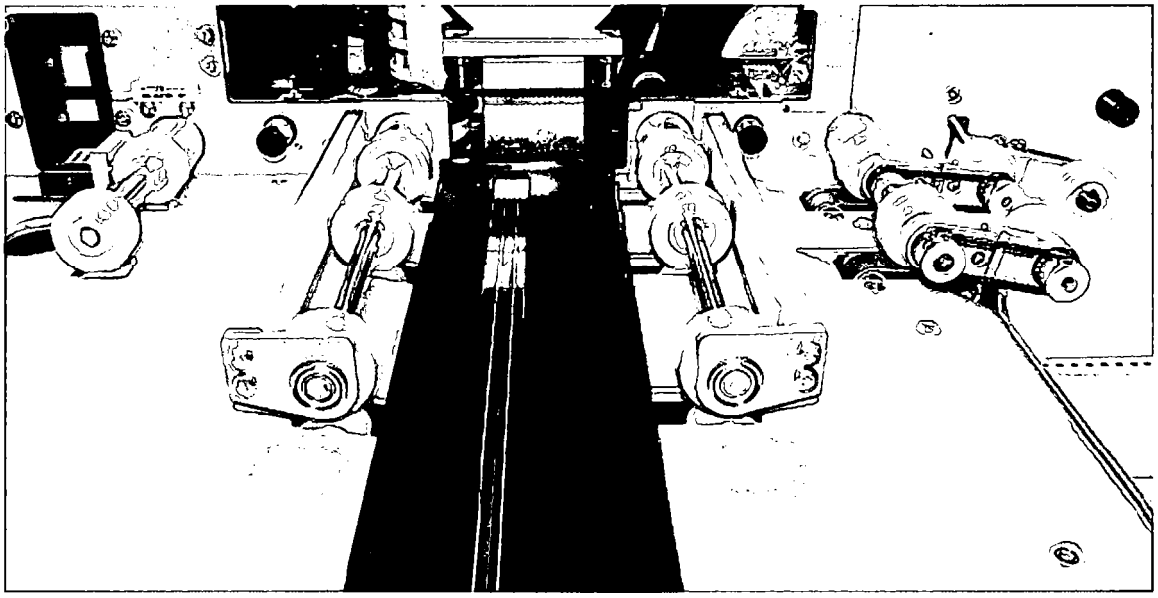
ES&S Response

The DS850 can scan more than 300 14-inch double-sided ballots per minute, including folded ballots, with full sorting options enabled.

The DS850 has been uniquely designed to accept ballots that have been folded. The DS850 uses a patented technology known as TruGrip™, to provide constant contact with each ballot. By using 22-axled, double-rollers, full control of the ballot is ensured from start to finish.

The DS850's TruGrip™ transport and motorized input and main output bins provide exceptional high speed scanning of folded and damaged ballots. The DS850 has successfully scanned in thousands of folded mail-in ballots for customers in numerous elections with excellent handling of the ballots, even when the ballots were damaged.

A close-up of the DS850 TruGrip rollers is shown below:



SOW # 2.2.2.5: Capable of sorting or out-stacking ballots with write-in votes.

ES&S Response

The DS850 uses three configurable sorting bins to sort out counted or uncounted ballots according to criteria including write-ins.

The DS850 has three options for the physical sorting of write-ins. Write-ins can be processed and not out-stacked, processed and out-stacked, or not processed and out-stacked.

The DS850 performs this sorting without stopping or slowing throughput. A bin report reports the reason for each sorted or out-stacked ballot down to the contest level for efficient review of the physical ballot. Such a report can be viewed on the screen or printed and sent with the ballots to be reviewed by an election official.

In addition, ballot images for ballots containing write-ins can be transmitted from the election reporting management software to ElectionWare for electronic evaluation.

SOW # 2.2.2.6: Capable of sorting or out-stacking ballots with overvotes.

ES&S RESPONSE

These sorts can be set up in the election definition based on the jurisdiction's counting rules. They may be later changed on the DS850 using an intuitive settings screen.

SOW # 2.3.1.1: System shall be accessible for individuals with disabilities, including nonvisual accessibility for the blind and visually impaired, in a manner that provides the same opportunity for access and participation (including privacy and independence) as for other voters.

ES&S RESPONSE

ES&S AutoMARK (Current System – EVS 5000)

The ES&S AutoMARK® (current system) helps voters with vision and mobility impairments mark standard paper ballots without assistance. The AutoMARK VAT has several privacy features. Audio volume can be increased or decreased as desired, and the screen can be turned on and off for privacy. If a voter wants to use the audio system to listen to ballot choices and instructions, the voter will use the audio keys on the keypad to control audio sound, which is played through headphones. The use of AutoMARK privacy shields lends additional privacy.

A voter can use the AutoMARK to mark a ballot with the touch screen, Braille keypad, or an optional AT device, such as puff-sip or foot pedal. The touch screen includes zoom and high contrast.

Use of the ES&S AutoMARK ensures the independent, private casting, inspection, verification and correction of secret ballots by voters with disabilities.

E&S ExpressVote (Future System – EVS 5200)

The ExpressVote® (future system) was developed with universal design principles applied to be usable by all voters, with or without a disability, without discrimination. The ExpressVote universal voting system combines paper-based voting with touch screen technology to create an innovative breakthrough in voting solutions

ExpressVote can serve every eligible voter, including those with special needs. The feature-rich system was created for people with or without visual impairments, hearing issues, or need for physical accommodations. As a fully compliant ADA (Americans with Disabilities Act) voting solution, ExpressVote enables each voter to cast his or her ballot autonomously.

The ExpressVote allows blind, low-vision, and limited dexterity voters to privately listen to instructions and selections at a volume, tone, and speed comfortable to them. They cast their votes unassisted, thereby maintaining their privacy and anonymity.

Functionality includes:

- Multiple user interfaces including touch screen, Braille-embossed keypad, sip-and-puff tube, and foot pedal or other two-way switch.
- Audio voting session via text-to-speech or .wav files with volume control and the same multi-language options available to sighted voters.
- Voter selects speed, tone, and volume.

- High-visibility on-screen ballots.
- Voter-selected font size and contrast settings.

The voter's ability to turn off the touch-screen display and the use of privacy screens lend additional privacy.

SOW # 2.3.1.4: Unit can be outfitted with tamper-evident security seals and/or locks.

ES&S RESPONSE

The ES&S AutoMARK election configuration card and key activated system controls are secured behind a locking panel on the front of the terminal. The terminal should always be stored in the transport case when not in use.

The ES&S ExpressVote election definition media device is secured behind a locking panel on the left side of the device.

ES&S has documented security recommendations for Pre-Election, Election Day and Post-Election security based on our own best practices and provides such recommendations in Standard Operating Procedure Manuals. Recommended practices for locking and placement of tamper-evident security seals can be found within these security recommendations in the manuals.

As part of our account management service, ES&S will assess Pinal County's election preparation, polling locations, and equipment storage facilities and share security recommendations based on that assessment.

SOW # 2.3.2.2: Easily transportable without damage to internal circuitry.

ES&S RESPONSE

AutoMARK (Current System)

ES&S AutoMARK assembly materials exceed Federal testing standards for vibration, shock, and environmental controls.

As part of the Federally mandated VSTL testing process, the ES&S AutoMARK has passed environmental testing and standard functionality testing. This testing subjects the equipment to storage and transportation stresses experienced by freight during transit by common carrier vehicles.

Most significantly, however, the most compelling evidence of the ES&S AutoMARK's durability is its proven, day-in and day-out use during elections across the country and abroad with over 42,000 units in use today.

The system's carrying case is made of Acrylonitrile Butadiene Styrene (ABS) plastic – an extremely durable material, universally used for protective purposes. The case can be locked and transported without additional packing. The sturdy construction of these cases renders them capable of withstanding impact, shock, and vibration loads accompanying surface and air transportation. It comes equipped with a set of heavy duty rollers on the base of the unit and a telescoping handle that allows easy movement.

ES&S AutoMARK's can be safely stacked up to five (5) units high during transport.

The AutoMARK weighs 48 pounds and is (WxDxH) 20.8"x26"x7.5"

The AutoMARK carrying case weighs 36 pounds and is (WxDxH) 27.7"x37.7"x14.1".

In transport, the AutoMARK is designed for these environmental conditions: 14-140 degrees Fahrenheit and 10-85% relative humidity.

ExpressVote (Future System)

Certification testing for EVS 5.2.0.0 requires that the ExpressVote be tested for and pass 2005 VVSG 1.0 Vol 1: 4.3.2, 4.3.3, 4.3.5, 4.3.7; Vol II: 4.7.1, 4.7.2, 4.7.3, and 4.7.4

ExpressVote is designed to be stacked up to eight (8) units high during storage. The ExpressVote booth must be stacked separately, without the ExpressVote unit in the booth, and can also stack up to eight (8) units high.

The ExpressVote was designed for easy transportation to/from storage and vote centers.

As configured for transport or storage, the ExpressVote is (W x D x H) 22.5" x 17" x 11".
The ExpressVote weighs less than 20 pounds.

The unit's Standard Operating Procedures Manual contains detailed directions to package the ExpressVote for transport in its soft-sided carrying case and in a shipping container for shipping.

ES&S Appendices

Appendix A
ES&S Audited Financials

Decide with Confidence

Business Information Report

Print this Report

Report Printed: SEP 06 2013
In Date

BUSINESS SUMMARY

ELECTION SYSTEMS & SOFTWARE LLC
ES&S
11208 John Galt Blvd
Omaha, NE 68137

Rating Change

This is a **headquarters** location.
Branch(es) or division(s) exist.

Web site:	www.essvote.com
Telephone:	402 593-0101
Chief executive:	ALDO TESI, PRES-CEO
Year started:	1979
Employs:	350 (150 here)
Net worth F:	$14,477,972
History:	CLEAR
Financing:	SECURED
Financial condition:	FAIR
SIC:	3577
Line of business:	Mfg computer peripheral equipment

D-U-N-S Number:	03-766-1667
D&B Rating:	**4A3** Formerly 3A3
Financial strength:	4A is **$10 to 50 million**.
Composite credit appraisal:	3 is **fair**.
D&B Viability Rating:	**21AG**

D&B PAYDEX®:

D&B PAYDEX: 79
When weighted by dollar amount, payments to suppliers average 2 days beyond terms.

Based on up to 24 months of trade.

SUMMARY ANALYSIS

D&B Rating: **4A3**
Financial strength: 4A indicates **$10 to 50 million**.
Composite credit appraisal: 3 is **fair**.

The Rating was changed on March 26, 2013 to reflect a change in the company's worth. This credit rating was assigned because of D&B's assessment of the company's financial ratios and its cash flow. For more information, see the D&B Rating Key.

Below is an overview of the company's rating history since 06/07/01:

D&B Rating	Date Applied
4A3	03/26/13

3A3	[illegible]/24/12
1R4	08/16/10
4A3	03/13/08
1R3	07/17/07
4A3	04/05/05
1R3	07/15/04
4A2	11/01/02
1R3	07/16/02
4A2	06/07/01

The Summary Analysis section reflects information in D&B's file as of September 2, 2013.

VIABILITY RATING ANALYSIS

The D&B Viability Rating uses D&B's proprietary analytics to compare the most predictive business risk indicators and deliver a highly reliable assessment of the probability that a company will no longer be in business within the next 12 months.

D&B VIABILITY RATING:21AG

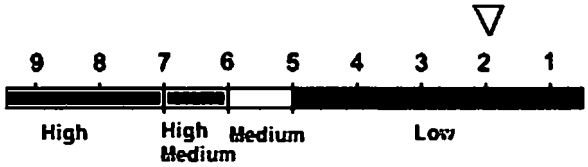
D&B VIABILITY RATING COMPONENTS:

VIABILITY SCORE:

Viability Score is the first of four components within the D&B Viability Rating. It is a high-level risk indicator that assesses the probability that a company will no longer be in business within the next 12 months, compared to all US businesses within the D&B database. A business is no longer viable when it goes out of business, becomes dormant/ inactive or files for bankruptcy. The ranking ranges from 1 to 9 where 9 reflects the highest probability of becoming no longer viable and 1 reflects the lowest probability.

NOTE: The Viability Score is best used when ranking all businesses within your portfolio based on the probability of becoming no longer viable.

Viability Score: 2



Compared to ALL US Business within D&B Database:

- **Level of risk:** Low Risk
- **Business ranked 2 have a probability of becoming no longer viable:** 2%
- **Percentage of business ranked 2:** 4%
- **Across all US business, the average probability of becoming no longer viable:** 14%

PORTFOLIO COMPARISON:

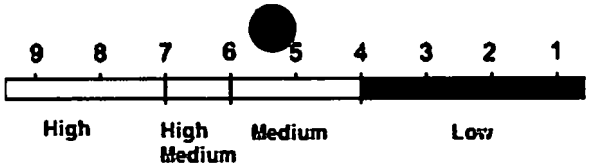
Portfolio Comparison is the second of four components within the D&B Viability Rating. Portfolio Comparison is a more detailed risk indicator that assesses the viability of a company compared to similar businesses within the same model segment which are determined by the amount and type of data available. A business is no longer viable when it goes out of business, becomes dormant/ inactive or files for bankruptcy. Every business within the D&B database falls into 1 of the following 4 profile segments:

1. Available Financial Data.
2. Established Trade Payments.
3. Limited trade Payments.
4. Firmographics and Business Activity.

The Portfolio Comparison ranking ranges from 1 to 9 where 9 reflects the highest probability of becoming no longer viable and 1 reflects the lowest probability.

NOTE: The Portfolio Comparison is best used when analyzing the individual risk level of a company compared to businesses within the same profile segment.

Portfolio Comparison: 1



Compared to all Business within the same MODEL SEGMENT:

- **Model Segment:** Established Trade Payments
- **Level of risk:** Low Risk
- **Business ranked 1 within this model segment have a probability of becoming no longer viable:** 2%
- **Percentage of business ranked 1 within this model segment:** 11%
- **Within this model segment, the average probability of becoming no longer viable:** 5%

DATA DEPTH INDICATOR:

Data Depth Indicator is the third of four components within the D&B Viability Rating. The Depth of Data Indicator presents the level of data available for a company. Data depth assists in the assessment of whether a company will no longer be viable and includes the following:

1. Financial Attributes.
2. Commercial Trading Activity.
3. Firmographics.

The level of data is represented by a letter on a scale of A - G where A reflects the greatest level of predictive data to make a highly reliable assessment of company viability, and G reflects a minimal level of data which can be considered descriptive. The more comprehensive the data, the more precise the overall D&B Viability Rating becomes. If a company has been placed in the Special Category, a letter ranging from H-M will be assigned to identify the specific reason.

Data Depth: A

Data Depth Indicator Details:

- Rich Firmographics
- Extensive Commercial Trading Activity
- Comprehensive Financial Attributes

COMPANY PROFILE:

Company Profile is the fourth of four components within the D&B Viability Rating. The Company Profile describes a company based on a combination of 4 categories:

1. Financial Data.
2. Trade Payments.
3. Company Size.
4. Years in Business.

A company is characterized by a letter which ranges from A - X; with each letter representing a combination of the 4 categories that make up the company's profile. For example, A describes a company with a comprehensive level data, which has been in business 5+ years, with 50+ employees or $500K+ in Sales, while X reflects a company with a minimal data, in business < 5 years, with < 10 employees or < $10K in Sales. Y and Z reflect a Branch and Subsidiary, respectively.

Company Profile: G

Company Profile Details:

- **Financial Data:**Not Available
- **Trade Payments :** Available: 3+Trade
- **Business Size:** Large: Employees:50+ or Sales: $500K+
- **Years in Business:**Established (Established: 5+)

CUSTOMER SERVICE

Need help? Call Customer Service at (800) 932-0025, Monday through Friday, 8:00 AM to 6:00 PM Local Time.

HISTORY

The following information was reported **03/26/2013**:

Officer(s): ALDO TESI, PRES-CEO
RICHARD J JABLONSKI, V PRES-FIN
TOM O'BRIEN, CFO
MICHAEL MCCARTHY, CHAIRMAN OF BOARD

DIRECTOR(S): The officers identified by (+) and Mike Mc Carthy, John Gottschalk, Manny Quevedo, Pat Jung, Bill Welsh, and Steve Seline.

The Nebraska Secretary of State's business registrations file showed that Election Systems & Software Inc was registered as a corporation on July 9, 2008.

Business started 1979 by Robert and Todd Urosevich. 100% of capital stock is owned by officers.

RECENT EVENTS:

On June 8, 2010, sources stated that Dominion Voting Systems, Inc., Jamestown, NY, announced that it has acquired all intellectual property, software, firmware and hardware from Premier Election Solutions, Inc., Allen, TX, a wholly owned subsidiary of Election Systems & Software Inc, Omaha, NE, on May 20, 2010. The terms of the transaction were not disclosed.

On September 11, 2009, sources stated that Premier Election Solutions, Inc., Allen, TX, was acquired by Election Systems & Software, Inc., Omaha, NE, on September 2, 2009. With this acquisition, Premier Election Solutions, Inc. will operate as a subsidiary of Election Systems & Software, Inc. Other details were not disclosed.

On January 28, 2008, Election Systems & Software (ES&S) announced that it has acquired substantially all of the assets of AutoMARK Technical Systems (ATS), LLC, Lisle, IL. As a result, ES&S will both manufacture and market the innovative AutoMARK Voter Assist Terminal. Terms of the transaction were not disclosed.

On April 13, 2007, an inside source stated that Election Systems and Software, Inc., Omaha, NE, announced that it has acquired Office Automation Solutions, Inc., Raleigh, NC. With the acquisition, Office Automation Solutions will be fully integrated into an existing ES&S facility in Cary, NC. Terms of the transaction were not disclosed.

On Jun 1 1999, the company acquired United States Election Corporation, West Chester, PA, and is now shown as a wholly owned subsidiary.

On Jun 30 1998, the company completed the acquisition of Election Products Inc, Urbanna, VA, which now shown as a wholly owned subsidiary.

In Nov 1997, the company acquired the Election Division of Business Records Corporation, Dallas, TX.

ALDO TESI. Antecedents are unknown.

RICHARD J JABLONSKI born 1959. 1977-1981 graduated from University of Nebraska, Lincoln, NE. 1981-1983 employed by Omaha World Herald, Omaha, NE. 1983-1987 employed by Rapid Printing, Omaha, NE, lastly as accounting manager. 1989-present active here.

TOM O'BRIEN. He was previously with Cornhusker Motor Lines.

CORPORATE FAMILY

Click below to buy a Business Information Report on that family member.

Subsidiaries (US):

Premier Election Solutions, Inc.	Allen, TX	DUNS # 18-045-0264

Branches (US):

Election Systems & Software Inc	Allen, TX	DUNS # 14-712-4341
Election Systems & Software LLC	Birmingham, AL	DUNS # 15-358-5138
Election Systems & Software LLC	Roseville, CA	DUNS # 03-957-5662
Election Systems & Software LLC	Rockford, IL	DUNS # 14-479-0037
Election Systems & Software LLC	Bowie, MD	DUNS # 07-878-1963

BUSINESS REGISTRATION

CORPORATE AND BUSINESS REGISTRATIONS REPORTED BY THE SECRETARY OF STATE OR OTHER OFFICIAL SOURCE AS OF APR 21 2012:

Registered Name: ELECTION SYSTEMS & SOFTWARE, LLC

Business type: LIMITED LIABILITY COMPANY

State of organization: DELAWARE

Filing date: APR 25 1988

Registration ID: 2158739

Status: STATUS NOT AVAILABLE

Where filed: SECRETARY OF STATE/CORPORATIONS DIVISION, DOVER, DE

Registered agent: NATIONAL REGISTERED AGENTS, INC., 160 GREENTREE DRIVE SUITE 101, DOVER, DE, 199040000

OPERATIONS

03/26/2013

Description: Manufactures computer peripheral equipment, specializing in optical scanning devices (100%).

Terms are Net 30 days. Sells to undetermined. Territory : undetermined.

Nonseasonal.

Employees: 350 which includes officer(s). 150 employed here.

Facilities: Leases 100,000 sq. ft. in brick building.

Location: Suburban business section on side street.

Branches: This business has multiple branches; detailed branch information is available in the D&B's linkage or family tree products.

Subsidiaries: This business has multiple subsidiaries, detailed subsidiary information is available in D&B's linkage or family tree products.

SIC & NAICS

SIC:
Based on information in our file, D&B has assigned this company an extended 8-digit SIC. D&B's use of 8-digit SICs enables us to be more specific to a company's operations than if we use the standard 4-digit code.

The 4-digit SIC numbers link to the description on the Occupational Safety & Health Administration (OSHA) Web site. Links open in a new browser window.

35770503 Optical scanning devices

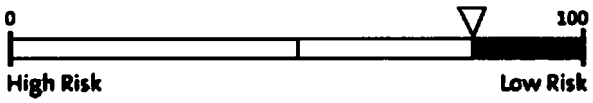
NAICS:

334118 Computer Terminal and Other Computer Peripheral Equipment Manufacturing

D&B PAYDEX

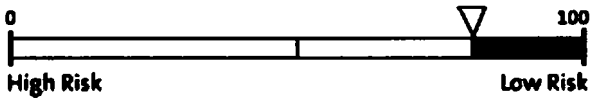
The D&B PAYDEX is a unique, dollar weighted indicator of payment performance based on up to 156 payment experiences as reported to D&B by trade references.

3-Month D&B PAYDEX: 80
When weighted by dollar amount, payments to suppliers average within terms.



Based on trade collected over last 3 months.

D&B PAYDEX: 79
When weighted by dollar amount, payments to suppliers average 2 days beyond terms.



Based on up to 24 months of trade.

When dollar amounts are not considered, then approximately 92% of the company's payments are within terms.

PAYMENT SUMMARY

The Payment Summary section reflects payment information in D&B's file as of the date of this report.

Below is an overview of the company's dollar-weighted payments, segmented by its suppliers' primary industries:

	Total Rcv'd (#)	Total Dollar Amts ($)	Largest High Credit ($)	Within Terms (%)	Days Slow <31 (%)	31-60	61-90	90>
Top industries:								
Telephone communictns	14	61,050	20,000	89	11	-	-	-
Whol electronic parts	6	308,300	250,000	100	-	-	-	-
Whol computers/softwr	5	502,000	400,000	100	-	-	-	-
Short-trm busn credit	5	201,900	200,000	100	-	-	-	-
Mfg computers	3	206,000	200,000	51	49	-	-	-
Public finance	3	150,500	100,000	66	34	-	-	-
Paper mill	2	500,000	250,000	100	-	-	-	-
Whol office supplies	2	35,500	35,000	100	-	-	-	-
Mfg elect. connectors	1	45,000	45,000	100	-	-	-	-
Mfg comp peripherals	1	40,000	40,000	100	-	-	-	-
OTHER INDUSTRIES	75	243,750	20,000	97	3	-	-	-
Other payment categories:								
Cash experiences	36	4,400	1,000					
Payment record unknown	3	67,500	60,000					
Unfavorable comments	0	0	0					
Placed for collections:								
With D&B	0	0						
Other	0	N/A						
Total in D&B's file	156	2,365,900	400,000					

The highest **Now Owes** on file is $2[illegible],000

The highest **Past Due** on file is $55,000

Dun & Bradstreet has 156 payment experiences in its file for this company. For your convenience, we have displayed 80 representative experiences in the PAYMENTS section.

PAYMENT DETAILS

Detailed Payment History

Date Reported (mm/yy)	Paying Record	High Credit ($)	Now Owes ($)	Past Due ($)	Selling Terms	Last Sale Within (months)
08/13	Ppt	10,000	2,500	0		1 mo
	Ppt	2,500	500	0		1 mo
	Ppt	1,000	0	0		1 mo
	Ppt	500	500	0		1 mo
	Ppt	500	0	0	N30	6-12 mos
07/13	Disc	250,000	60,000	0		1 mo
	Disc	2,500	100	0	1 10 N30	1 mo
	Ppt	250,000	10,000	0		1 mo
	Ppt	250,000	250,000	5,000		1 mo
	Ppt	100,000	70,000	0	N30	1 mo
	Ppt	35,000	0	0	1 10 N30	6-12 mos
	Ppt	20,000	2,500	0		1 mo
	Ppt	20,000	5,000	0		1 mo
	Ppt	15,000	5,000	0		1 mo
	Ppt	15,000	5,000	0		1 mo
	Ppt	15,000	7,500	0		1 mo
	Ppt	10,000	500	0		1 mo
	Ppt	7,500	0	0		6-12 mos
	Ppt	7,500	7,500	0		1 mo
	Ppt	7,500	750	0		1 mo
	Ppt	5,000	0	0		1 mo
	Ppt	5,000	0	0		1 mo
	Ppt	5,000	5,000	0		1 mo
	Ppt	5,000	1,000	0		1 mo
	Ppt	5,000	5,000	0		1 mo
	Ppt	5,000	0	0		1 mo
	Ppt	2,500	250	0		1 mo
	Ppt	2,500	500	0		1 mo
	Ppt	2,500	500	0		1 mo
	Ppt	2,500	0	0		6-12 mos
	Ppt	2,500	1,000	0		1 mo
	Ppt	2,500	100	0		1 mo
	Ppt	2,500	0	0		6-12 mos
	Ppt	2,500	2,500	0		1 mo

	Ppt	2,500	0	0		2-3 mos
	Ppt	1,000	1,000	0	N30	1 mo
	Ppt	1,000	0	0	N30	6-12 mos
	Ppt	1,000	0	0		6-12 mos
	Ppt	1,000	1,000	0		1 mo
	Ppt	1,000	50	0	N30	1 mo
	Ppt	1,000	50	0		1 mo
	Ppt	1,000	250	0	Lease Agreemnt	1 mo
	Ppt	1,000	1,000	0		1 mo
	Ppt	750	0	0		2-3 mos
	Ppt	750	100	0		1 mo
	Ppt	750	0			1 mo
	Ppt	750	0	0	N30	4-5 mos
	Ppt	750	750	0	N30	1 mo
	Ppt	500	500	0		1 mo
	Ppt	500	500	0		1 mo
	Ppt	500	500	0	N30	1 mo
	Ppt	500	0	0	N30	6-12 mos
	Ppt	500	100	0	N30	1 mo
	Ppt	250	250	0		1 mo
	Ppt	250	50	0		1 mo
	Ppt	250	0	0		2-3 mos
	Ppt	100	100	0		1 mo
	Ppt	100	100	0		1 mo
	Ppt	100	0	0		6-12 mos
	Ppt	100	100	0		1 mo
	Ppt	100	100	0		1 mo
	Ppt	50	0	0		6-12 mos
	Ppt	50	0	0		6-12 mos
	Ppt	50	0	0		6-12 mos
	Ppt	0	0	0	N30	6-12 mos
	Ppt	0	0	0	N30	6-12 mos
	Ppt	0	0	0	N30	1 mo
	Ppt-Slow 15	1,000	1,000	500		1 mo
	Ppt-Slow 30		100	0		1 mo
	Ppt-Slow 30	200,000	40,000	2,500		1 mo
	Ppt-Slow 30	10,000	500	0		1 mo
	Ppt-Slow 30	2,500	1,000	250		1 mo
	Slow 30	1,000	100	100		1 mo
	Slow 30	1,000	0	0		6-12 mos
	(075)	0	0	0	Cash account	6-12 mos
06/13	Ppt	1,000	0	0		1 mo
	Ppt	250	0	0		6-12 mos
05/13	Slow	50,000				1 mo
	(079)	50			Cash account	2-3 mos
	Cash own option.					
	(080)	50			Cash account	1 mo
	Cash own option.					

Payment experiences reflect how bills are met in relation to the terms granted. In some instances payment beyond terms can be the result of disputes over merchandise, skipped invoices etc.

Each experience shown is from a separate supplier. Updated trade experiences replace those previously reported.

FINANCE

03/26/2013

Three-year statement comparative:

	Fiscal Sep 30 2008	Fiscal Sep 30 2011	Fiscal Sep 30 2012
Current Assets	87,870,468	64,977,346	67,527,902
Current Liabs	45,136,583	52,005,061	53,479,224
Current Ratio	1.95	1.25	1.26
Working Capital	42,733,885	12,972,285	14,048,678
Other Assets	28,282,381	23,954,775	27,613,001
Net Worth	32,739,278	8,159,315	14,477,972
Sales		114,082,281	
Long Term Liab	38,276,988	28,767,745	27,183,707
Net Profit (Loss)		5,991,950	

Statement received by mail MAR 26 2013. Extent of audit, if any, not indicated.

. ------ STATEMENT ITEM EXPLANATIONS ------ .

The complete balance sheet was reviewed in its entirety and the above highlights were extracted for publication.

There are intangibles which represent $22,833,715 goodwill and intangibles/other assets.

The statement includes no deferred credits.

Contingencies
None.

Non-current assets consist of property & equipment-net, goodwill and intangibles/other assets.

Long term liabilities consist of long-term debt-net, deferred income taxes and derivative instrument at fair value.

CURRENT ASSETS
Consist of cash, accounts receivable-net, income taxes receivable, inventories, deferred income taxes and prepaid expenses/other.

CURRENT LIABILITIES
Consist of accounts payable, current portion of long-term debt, accruals, taxes and deferred revenue.

LIQUIDITY
Liquid assets provide adequate coverage of current liabilities.

On March 26, 2013, the financial information was updated.

KEY BUSINESS RATIOS

Statement date: SEP 30 2012
Based on this number of establishments: 24

Firm		**Industry Median**	
Return of Sales:	UN	Return of Sales:	4.0
Current Ratio:	1.3	Current Ratio:	2.5
Assets / Sales:	UN	Assets / Sales:	134.1
Total Liability / Net Worth:	UN	Total Liability / Net Worth:	68.0

UN = Unavailable

PUBLIC FILINGS

The following Public Filing data is for information purposes only and is not the official record. Certified copies can only be obtained from the official source.

SUITS

Suit amount:	**$4,500**
Status:	**Dismissed**
CASE NO.:	05771 SCSC541547
Plaintiff:	SUMTOTAL SYSTEMS LLC
Defendant:	ELECTION SYSTEMS AND SOFTWARE
Cause:	MONEY JUDGEMENT
Where filed:	POLK COUNTY SMALL CLAIMS COURT, DES MOINES, IA
Date status attained:	07/03/2013
Date filed:	05/15/2013
Latest Info Received:	08/01/2013

Status:	**Pending**
CASE NO.:	1:10-cv-00380
Plaintiff:	United States of America, Washington, DC State of Tennessee, Nashville, TN State of Washington, Seattle, WA State of Arizona, Phoenix, AZ State of Colorado, Denver, CO
Defendant:	Election Systems and Software, Inc.
Where filed:	U S DISTRICT COURT - DISTRICT OF COLUMBIA, Washington, DC
Date status attained:	03/08/2010
Date filed:	03/08/2010
Latest Info Collected:	03/09/2010

If it is indicated that there are defendants other than the report subject, the lawsuit may be an action to clear title to property and does not necessarily imply a claim for money against the subject.

LIENS

A lienholder can file the same lien in more than one filing location. The appearance of multiple liens filed by the same lienholder against a debtor may be indicative of such an occurrence.

Status:	**Open**
DOCKET NO.:	13-0263246
Type:	State Tax
Filed by:	STATE OF ALABAMA
Against:	ES&S, BIRMINGHAM, AL AND OTHERS
Where filed:	SECRETARY OF STATE/UCC DIVISION, MONTGOMERY, AL
Date status attained:	06/05/2013
Date filed:	06/05/2013
Latest Info Received:	06/16/2013

Status:	**Open**
DOCKET NO.:	12-0518560
Type:	State Tax
Filed by:	STATE OF ALABAMA
Against:	ELECTION SYSTEMS & SOFTWARE INC
Where filed:	SECRETARY OF STATE/UCC DIVISION, MONTGOMERY, AL
Date status attained:	09/25/2012
Date filed:	09/25/2012
Latest Info Received:	10/07/2012

Status:	**Open**
DOCKET NO.:	12-0465643

Type: State Tax

Filed by: STATE OF ALABAMA
Against: ES&S, BIRMINGHAM, AL AND OTHERS
Where filed: SECRETARY OF STATE/UCC DIVISION, MONTGOMERY, AL

Date status attained: 08/27/2012
Date filed: 08/27/2012
Latest Info Received: 09/09/2012

Amount: **$1,240 (UNEMPLOYMENT)**
Status: **Open**
CASE NO.: 329429V
Type: State Tax
Filed by: STATE OF MARYLAND
Against: METROPOLITAN DENTAL INC.
Where filed: MONTGOMERY COUNTY CIRCUIT COURT, ROCKVILLE, MD

Date status attained: 04/01/2010
Date filed: 04/01/2010
Latest Info Received: 04/09/2010

UCC FILINGS

Collateral: All Assets
Type: Original
Sec. party: BANK OF AMERICA, N.A., AS ADMINISTRATIVE AGENT, DALLAS, TX
Debtor: ES&S INNOVATIONS, LLC
Filing number: 2011 1196032
Filed with: SECRETARY OF STATE/UCC DIVISION, DOVER, DE

Date filed: 03/31/2011
Latest Info Received: 04/20/2011

Collateral: All Assets
Type: Original
Sec. party: BANK OF AMERICA, N.A., AS ADMINISTRATIVE AGENT, DALLAS, TX
Debtor: ELECTION SYSTEMS & SOFTWARE INTERNATIONAL, INC.
Filing number: 2011 1195968
Filed with: SECRETARY OF STATE/UCC DIVISION, DOVER, DE

Date filed: 03/31/2011
Latest Info Received: 04/20/2011

Collateral: All Assets
Type: Original
Sec. party: BANK OF AMERICA, N.A., AS ADMINISTRATIVE AGENT, DALLAS, TX
Debtor: ES&S AUTOMARK, LLC
Filing number: 2011 1195901
Filed with: SECRETARY OF STATE/UCC DIVISION, DOVER, DE

Date filed: 03/31/2011
Latest Info Received: 04/20/2011

Collateral: All Assets
Type: Original
Sec. party: BANK OF AMERICA, N.A., AS ADMINISTRATIVE AGENT, DALLAS, TX
Debtor: ELECTION SYSTEMS & SOFTWARE, INC.
Filing number: 2011 1195828
Filed with: SECRETARY OF STATE/UCC DIVISION, DOVER, DE

Date filed: 03/31/2011
Latest Info Received: 04/20/2011

Collateral: Negotiable instruments and proceeds
Type: Original
Sec. party: BANK OF THE WEST, OMAHA, NE
Debtor: CARBILLIDO, KENNETH
Filing number: 9906450364-3
Filed with: SECRETARY OF STATE/UCC DIVISION, LINCOLN, NE

Date filed: 04/26/2006
Latest Info Received: 06/08/2006

Collateral: Negotiable instruments and proceeds
Type: Original
Sec. party: BANK OF THE WEST, OMAHA, NE
Debtor: GROH, JOHN
Filing number: 9906450363-1
Filed with: SECRETARY OF STATE/UCC DIVISION, LINCOLN, NE

Date filed: 04/26/2006
Latest Info Received: 06/08/2006

Collateral: Negotiable instruments and proceeds
Type: Original
Sec. party: BANK OF THE WEST, OMAHA, NE
Debtor: CRUMP, GARY
Filing number: 9906450360-5
Filed with: SECRETARY OF STATE/UCC DIVISION, LINCOLN, NE

Date filed: 04/26/2006
Latest Info Received: 06/08/2006

Collateral: Negotiable instruments and proceeds
Type: Original
Sec. party: BANK OF THE WEST, OMAHA, NE
Debtor: TESI, ALDO
Filing number: 9906450359-2
Filed with: SECRETARY OF STATE/UCC DIVISION, LINCOLN, NE

Date filed: 04/26/2006
Latest Info Received: 06/08/2006

Type: Amendment
Sec. party: BANK OF THE WEST, OMAHA, NE
Debtor: TESI, ALDO
Filing number: 9909582225-4
Filed with: SECRETARY OF STATE/UCC DIVISION, LINCOLN, NE

Date filed: 01/08/2009
Latest Info Received: 01/15/2009
Original UCC filed date: 04/26/2006
Original filing no.: 9906450359-2

Collateral: Negotiable instruments and proceeds
Type: Original
Sec. party: BANK OF THE WEST, OMAHA, NE
Debtor: O'BRIEN, THOMAS
Filing number: 9906450358-0
Filed with: SECRETARY OF STATE/UCC DIVISION, LINCOLN, NE

Date filed: 04/26/2006
Latest Info Received: 06/08/2006

Type: Amendment
Sec. party: BANK OF THE WEST, OMAHA, NE
Debtor: O'BRIEN, THOMAS

Filing number: 9[illegible]9582224-2
Filed with: SECRETARY OF STATE/UCC DIVISION, LINCOLN, NE

Date filed: 01/08/2009
Latest Info Received: 01/15/2009
Original UCC filed date: 04/26/2006
Original filing no.: 9906450358-0

Collateral: Equipment
Type: Original
Sec. party: U.S. BANK EQUIPMENT FINANCE, MARSHALL, MN
Debtor: ELECTION SYSTEMS & SOFTWARE, LLC, BIRMINGHAM, AL
Filing number: 2012 2413336
Filed with: SECRETARY OF STATE/UCC DIVISION, DOVER, DE

Date filed: 06/21/2012
Latest Info Received: 07/13/2012
There are additional UCC's in D&B's file on this company available by contacting 1-800-234-3867.

The public record items contained in this report may have been paid, terminated, vacated or released prior to the date this report was printed.

GOVERNMENT ACTIVITY

Activity summary

Borrower (Dir/Guar):	NO
Administrative debt:	NO
Contractor:	NO
Grantee:	NO
Party excluded from federal program(s):	NO

Possible candidate for socio-economic program consideration

Labor surplus area:	N/A
Small Business:	YES (2013)
8(A) firm:	N/A

The details provided in the Government Activity section are as reported to Dun & Bradstreet by the federal government and other sources.

Appendix C
AZ SOS Letter-Certification

KEN BENNETT
SECRETARY OF STATE
STATE OF ARIZONA

June 17, 2013

Christopher Bruscino
State Certification Manager
Election Systems and Software
11208 John Galt Blvd.
Omaha, NE 68137

Dear Mr. Bruscino:

Election Systems & Software (ES&S) has requested certification of the EVS 5.0.0.0 Voting System along with 15 Engineering Change Orders (ECOs), and has provided supporting documentation with the application. The EVS 5.0.0.0 Voting System has completed federal testing, United States Election Assistance Commission (EAC) review, and has been issued Certification Number ESSEVS5000 by the EAC.

The Secretary of State Equipment Certification Advisory Committee, appointed by me pursuant to A.R.S. § 16-442, has reviewed ES&S's application and documentation, the federal testing reports, and other supporting materials. The committee also conducted a test demonstration in a public meeting held June 7, 2013, and has forwarded its findings and recommendation for certification.

I concur with the committee report and hereby approve and certify for use in Arizona's state, county, city, and town elections the ES&S EVS 5.0.0.0 Voting System with the attached 15 ECOs listed in the EAC Scope of Certification, which includes (where "FW" stands for firmware and "HW" stands for hardware):

- ElectionWare (FW version 4.1.0.0)
- Event Log Service (FW version 1.5.0.0)
- Election Reporting Manager (ERM) (FW version 8.6.0.0)
- Removable Media Service (FW version 1.4.0.0)
- VAT Previewer (FW version 1.8.1.0)
- Paper Ballot (FW version 3.1.0.0)
- DS200 HW v.1.2 (FW version 2.7.0.0)
- DS850 HW v.1.0 (FW version 2.4.0.0)
- AutoMARK A100 HW v.1.0 (FW version 1.8.1.0)
- AutoMARK A200 HW v.1.1 (FW version 1.8.1.0)

1700 W. Washington Street, 7th Floor
Phoenix, Arizona 85007-2888
Telephone (602) 542-4285 Fax (602) 542-1575
www.azsos.gov

- AutoMARK A200 HW v.1.3 (FW version 1.8.1.0)
- AutoMARK A300 HW v.1.3 (FW version 1.8.1.0)
- DS200 Plastic Ballot Box (HW versions 1.2, 1.3)
- Metal Ballot Box with Diverter (HW versions 1.0, 1.1, 1.2)
- Metal Ballot Box without Diverter (HW versions 1.0, 1.1, 1.2)

As a reminder, before the voting system may be used in a state election, the application source code must be placed in escrow with the State of Arizona as the recipient of escrow. Should questions arise regarding this certification, please contact Kris Kingsmore, Assistant State Election Director, at 602-542-6209.

Sincerely,

Ken Bennett
Secretary of State

KB/er
Attachment

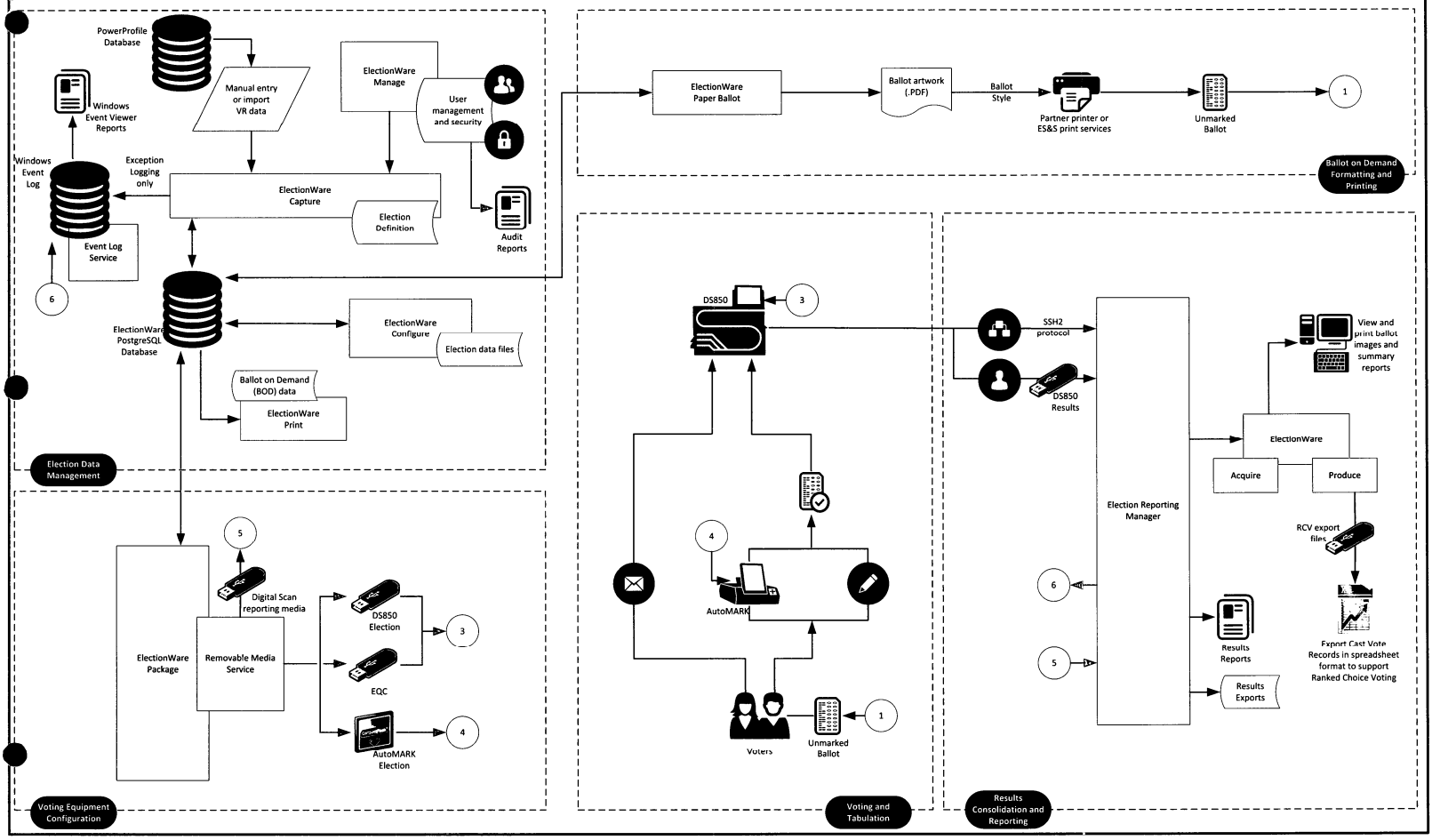
This table depicts the ECO's certified with the ES&S EVS 5.0.0.0 voting system:

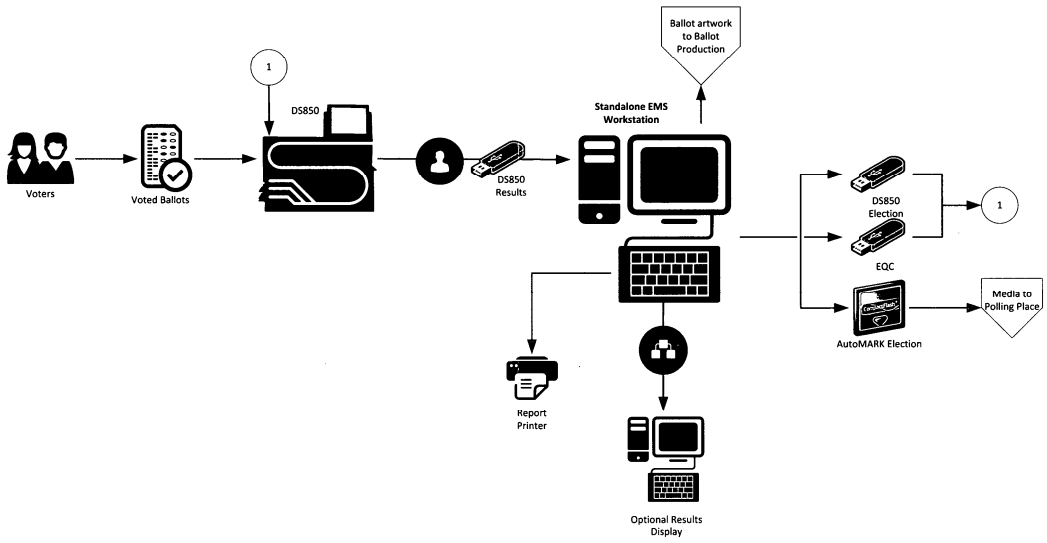
Change ID	Date	Component	Description	Inclusion
872	6/25/12	DS200/DS850	Release a new 4 GB USB thumb drive	De Minimis Optional
873	6/25/12	DS200/DS850	Release a new 8 GB USB thumb drive	De Minimis Optional
875	6/25/12	AutoMARK	Release 1GB Compact Flash	De Minimis Optional
876	11/10/11	AutoMARK	Redefine AutoMARK hardware revision level	De Minimis Optional
878	6/25/12	AutoMARK	End of Life AutoMARK components	De Minimis Optional
881	8/31/12	DS200/DS850	Allow color housing on 1gb, 2gb, 4gb and 8gb USB drives	De Minimis Optional
882	10/26/12	DS200/DS850	Introduce Delkin 1gb & 2gb USB drives	De Minimis Optional
884	8/31/12	DS200	Add rubber gasket for steel ballot box	De Minimis Optional
1029	8/31/12	DS200/DS850	Introduce new delkin compact flash	De Minimis Optional
1160	4/12/13	DS200	Counterfeit Sensor is end of life.	De Minimis Optional
1266	5/2/13	DS200 Carry Case	Improve DS200 Carry Case Latch Bracket	De Minimis Optional
1281	4/30/13	DS200	Transport Assembly Redesign	De Minimis Optional
1346	3/7/13	DS200	Change intElect logo to ESS	De Minimis Optional
1351	5/2/13	DS200 Carry Case	DS200 Carry Case replace cross recess screws with Torx head screws	De Minimis Optional
1388	5/2/13	DS200 Carry Case	Add a hinge reinforcement bracket to the DS200 carry case	De Minimis Optional

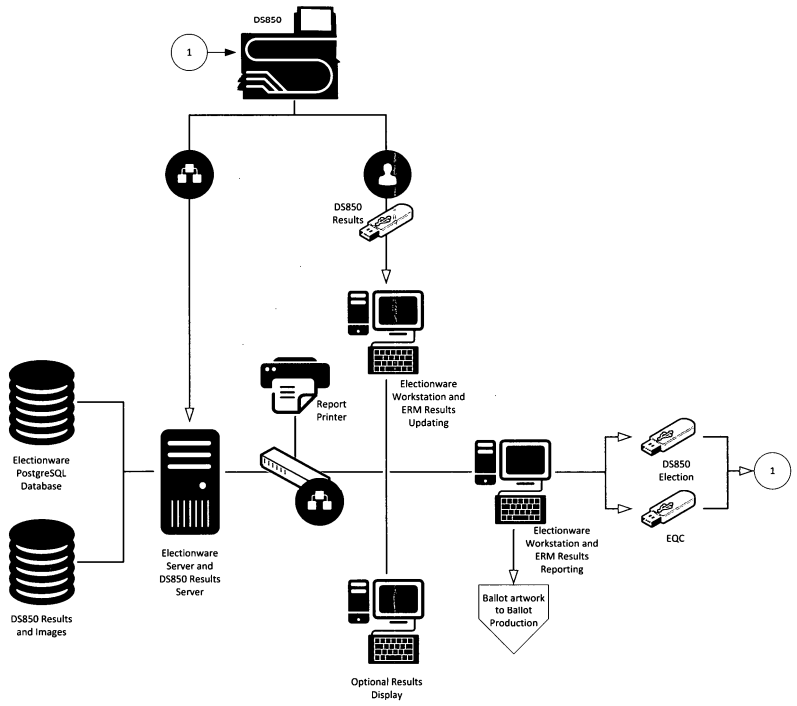
Appendix D
EVS 5000 Configuration Diagrams

Election Systems & Software: EVS 5.0.0.0, Pinal County, AZ - System Configuration

Rev. 1.0 | Dept. Certification | Date: 03.31.2014



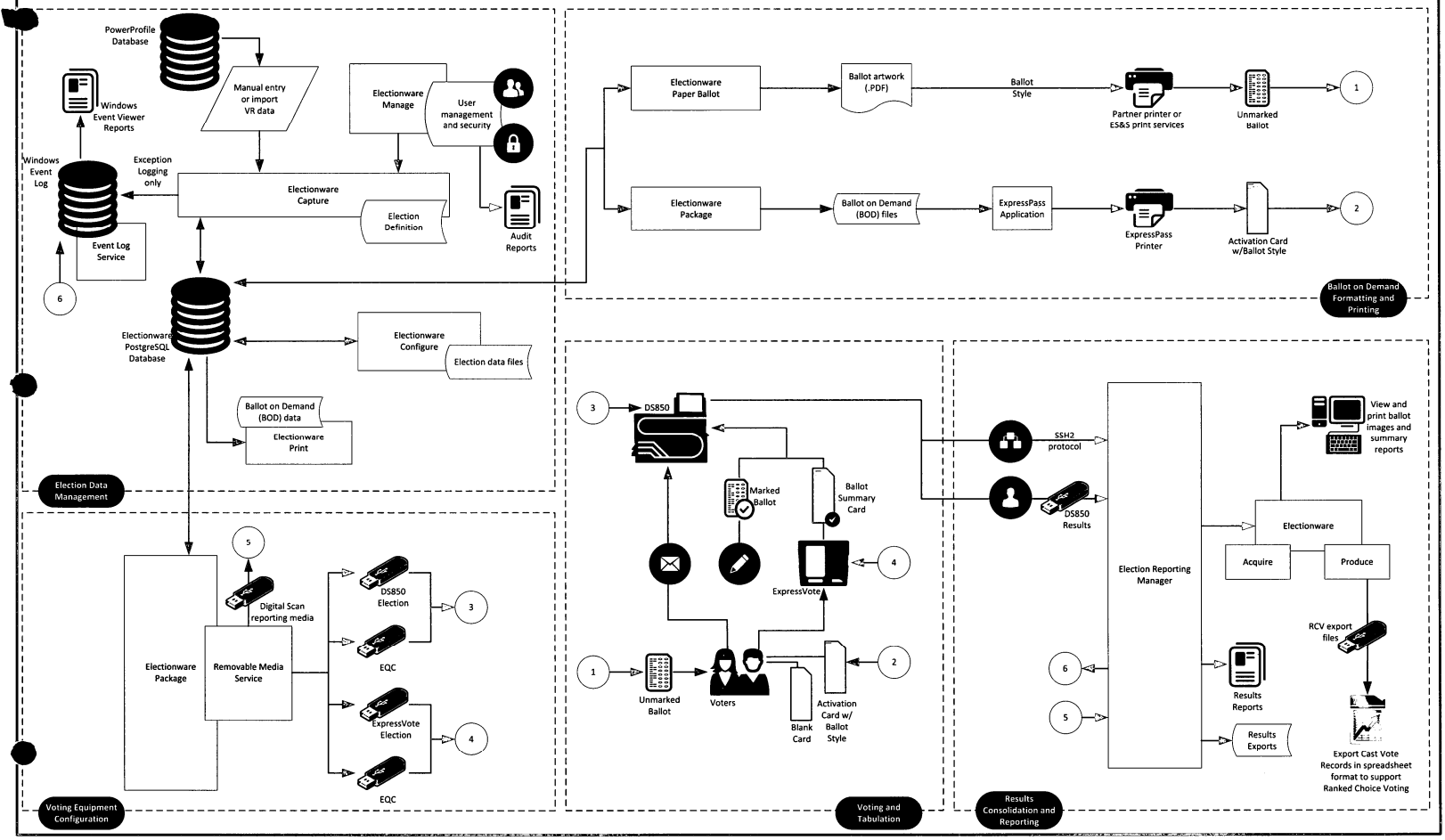

Ballot artwork to Ballot Production
1
DS850
Standalone EMS Workstation
Voters
Voted Ballots
DS850 Results
DS850 Election
1
EQC
Media to Polling Place
AutoMARK Election
Report Printer
Optional Results Display


DS850
1
DS850 Results
Electionware Workstation and ERM Results Updating
Report Printer
Electionware PostgreSQL Database
Electionware Server and DS850 Results Server
DS850 Results and Images
Optional Results Display
Electionware Workstation and ERM Results Reporting
Ballot artwork to Ballot Production
DS850 Election
EQC
1

Appendix E
EVS 5200 Configuration Diagram

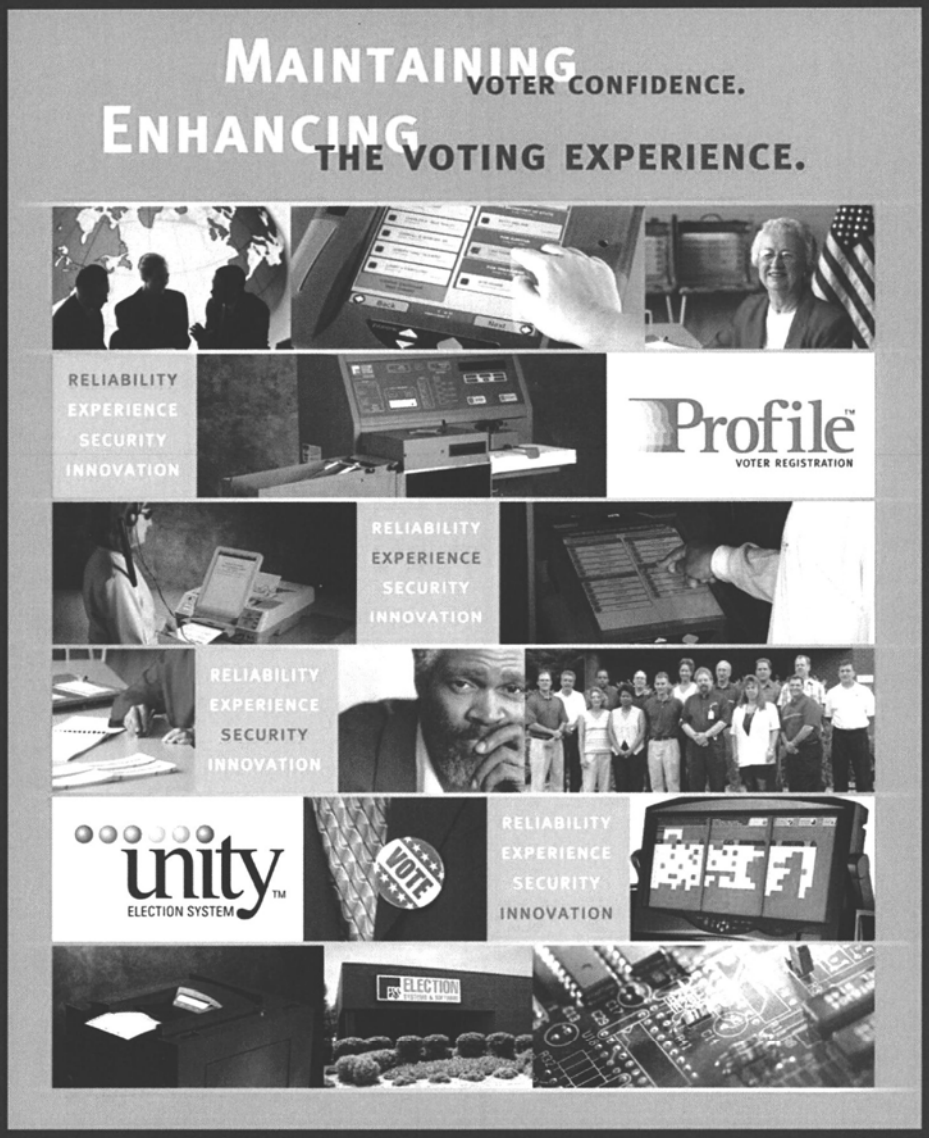
Election Systems & Software: EVS 5.2.0.0, Pinal County, AZ - System Configuration

Rev. 1.0	Dept. Certification	Date: 03.31.2014



Appendix F
EVS 5000 System Overview

ELECTION SYSTEMS & SOFTWARE



A HERITAGE OF PARTNERSHIP AND INNOVATION

Election Systems & Software

System Overview
ES&S Voting System 5.0.0.0

Print Date
February 13, 2013

Election Systems & Software, LLC
System Overview
ES&S Voting System 5.0.0.0

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

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Proprietary Information

ES&S has identified and appropriately marked relevant portions of this document, which it considers confidential and proprietary. We request confidential treatment by the EAC of such information and would expect that such information is exempt from required disclosure. In the event that a third party requests disclosure of information which ES&S considers confidential and proprietary, we would ask that the EAC notify ES&S of such requested disclosure in order to provide us with an opportunity to seek exemption from disclosure.

The document sections referenced below contain Election Systems and Software, LLC (ES&S) confidential information, which is provided for the sole purpose of permitting the recipient, to evaluate the ES&S Voting System submitted herewith. The following sections are designated as "Proprietary and Confidential" by Election Systems & Software.

Document Section	Description
N/A	

Table of Changes

Revision	Date of Change	Description of Change
1.0	11.14.2011	Initial Document.
2.0	2.16.2012	Updated system diagrams under sections 1.3 Updated Section 1.8 to reflect a revised install order.
3.0	3.23.2012	Updated Section I.C, "Scope," for clarity. Updated Windows Server version under Section 1.8. Edits for clarity and readability.
3.1	3.26.2012	Updated references to the DS200 and DS850 to indicate that the image scanner type is digital.
3.2	4.4.2012	Updated the descriptions for ElectionWare Acquire and Produce under Section 1.3. Added Appendix H, Documentation Map.
4.0	4.18.2012	Updates for readability. Updated system diagrams throughout to use consistent terminology to name system servers.
5.0	5.24.2012	Added Section 2.3.7.1.1, "Justification for Wireless Results Transfer."
6.0	6.8.2012	Updated Appendix A, "Voting System Limitations" based on internal review.
7.0	6.13.2012	Updated Appendix A, "Voting System Limitations" based on internal review.
8.0	6.25.2012	Updated usability test reports to remove references to optical scanning. Updated battery specifications included with Appendix C.
9.0	8.13.2012	Revised to match updated system configuration. Removed previous Appendix F. Updated Appendix B to match updated system configuration. Updated Appendix references.
10.0	10.1.2012	Updated system limitations in Appendix A. Updated product versioning in Appendix B.
11.0	11.8.2012	Removed references to unsupported equipment.
12.0	12.28.2012	Updated Appendix A, Appendix B and Appendix C to remove references to unsupported system functions.
13.0	1.10.2013	Updated Appendix B, "Voting System Summary."
14.0	1.13.2013	Updated Appendix B to include the AutoMARK A-300 hardware revision.
15.0	2.13.2013	Updated Appendix A to include ElectionWare field length boundaries.

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I. INTRODUCTION

The *System Overview* identifies the functional and physical components of the ES&S voting system, describes how the components are structured and identifies the interfaces between components.

A. RELATIONSHIP TO OTHER SYSTEMS

ES&S Voting System version 5.0.0.0 (EVS5000) is ES&S's first voting system to fully comply with the *EAC 2005 Voluntary Voting System Guidelines, Version 1.0*. The system includes a number of new products and features including ES&S' newest election management software solution, ElectionWare, and functionality to network multiple ES&S DS850 central ballot scanners to a single reporting PC for high-speed counting and results accumulation.

ES&S Voting System version 5.0.0.0 is the next step in providing voting systems capable of meeting the varied needs of every voting jurisdiction, and reaffirms ES&S's commitment to providing customers with the most accurate, reliable and secure voting systems in the world.

B. PURPOSE

This document includes a description of system functionality and catalogs system performance characteristics for the ES&S voting system.

The intended audience for the *System Overview* includes the Election Assistance Commission (EAC), Voting System Test Laboratory (VSTL) stakeholders, state election officials, ES&S Voting System users, ES&S personnel, and configuration management stakeholders.

This document serves two purposes. Prior to release of a system for end-users, this document describes the functional and physical configuration for an identified voting system. ES&S product stakeholders, documentation specialists and Quality Assurance specialists can use this document to perform the following tasks:

- Define the functional and physical configuration of the voting system
- Define the system configuration and functional capabilities for internal ES&S stakeholders
- Define the system framework for production of technical and end-user documentation

After release to certification, VSTL stakeholders can use this document to:

- Understand the functional and physical configuration of the voting system
- Understand the overall structure and theory of operation for the identified voting system

C. SCOPE

The *System Overview* includes a detailed overview of the voting system and descriptions of each included component. Detailed technical information is provided in the system Technical Data Package (TDP).

The features and functionality described in the *System Overview* reflect the system configuration promoted by ES&S for certification testing. Individual components of the voting system may exceed system level limitations documented here. Additionally, individual voting system components may support capabilities that are beyond the scope of ES&S' declared functional support. See Appendix E, "Conformance Statement," for a listing of the Voluntary Voting System Requirements that ES&S officially supports with this voting system.

D. Definitions and Acronyms

Definitions used in this document conform to company standards set forth herein and to definitions included in the EAC 2005 *Voluntary Voting System Guidelines*. Other definitions are consistent with those found in *ANSI/IEEE Std 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology* and *ISO 10007 Quality Management – Guidelines for Configuration Management*.

1. Definitions

Americans with Disabilities Act (ADA)	The *Americans with Disabilities Act* was passed in 1990 to provide Americans with physical or mental disabilities legal recourse against discrimination. The *ADA* is intended to make sure that individuals with disabilities are provided with equal opportunities, full participation, independent living and economic self-sufficiency. The *ADA* ensures that individuals with disabilities are allowed equal access to *polling places* and the opportunity to vote with the same privacy as individuals without disabilities.
audit log	An automated means to trace back to the original source of data, any input record or process performed by a system.
central counter (central scanner, central tabulator)	A *central counter* or *central scanner* is a high-speed ballot tabulator that is used to scan ballots and accumulate voter selections. Jurisdictions that use *central scanners* transport ballots from various polling places to a *central count location* where the ballots are scanned and tabulated. Some jurisdictions mix systems and use *central scanners* to count *absentee ballots* and *precinct counters* to scan ballots that are cast on Election Day.
certification	A formal demonstration, by a duly authorized body, that a product, process or service complies with its specified requirements and is acceptable for its intended use.
overvote	An *overvote* occurs when a voter selects more than the allowed number of candidates in a contest. For example, if a city council election allows a voter to select two candidates and the voter selects three, the voter has committed an *overvote*. *Overvoted* ballots are generally *sorted* out of the regular ballot population and presented to a *resolution board* that analyzes the ballot for *voter intent*. If *voter intent* cannot be determined, the *overvote* is not counted with regular ballot totals.
target	A voting *target* is the selection area next to a ballot response that voters mark to indicate candidate selections. Some examples of voting *targets* are ovals, arrows, *touch screen* boxes or punch areas. When a *target* area is selected by a voter, the scanner records a vote for the corresponding candidate or ballot option.
Technical Data Package (TDP)	A *Technical Data Package* includes all voting system documentation required by the VVSG. A *TDP* contains all of the documentation for a voting system including, but not limited to, user manuals, software and hardware specifications, software change releases and system drawings.
undervote	An *undervote* occurs when a voter selects fewer than the allowed number of voting targets in a contest. For example, an undervote is recorded if a voter selects one candidate in a race where three candidates can be selected. Unlike *overvotes*, candidates selected in an *undervoted* contest are counted as valid votes.

2. Acronyms

EAC	Election Assistance Commission
ERM	Election Reporting Manager
EVS	ES&S Voting System
ELS	ES&S Event Log Service
VSTL	Voting System Test Laboratory
VVSG	Voluntary Voting System Guidelines

E. References and Resources

ES&S considered the following standards and resources in the design and application of this voting system or references the listed title from this document. The latest revisions apply.

VVSG 1.0	EAC Voluntary Voting System Guidelines v. 1.0
ANSI/IEEE Std 610-1990	IEEE Standard Glossary of Software Engineering Terminology
Voting System Limitations	TDP Section 01 – (EVS5000_OVR01_AppxA_SystemLimits)
Voting System Summary	TDP Section 01 – (EVS5000_OVR02_AppxB_VotingSystemSummary)

F. Document Organization

This document mirrors the organization of Volume II, Section 2.2 of the 2005 EAC *Voluntary Voting System Guidelines (VVSG)*. Section numbering, beginning in the following section, matches the third level numbering for requirements from Volume II, Section 2.2. For example, requirements appearing in Section 2.2.1 of Volume II in the VVSG are addressed in Section 1 of this document.

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1. SYSTEM DESCRIPTION

ES&S Voting System 5.0.0.0 provides a scalable, end-to-end election system for jurisdictions with widely varied requirements. The system includes:

- **ElectionWare** Election Management System software for defining contents, candidates and ballot formats and performing results post-processing.
- The **DS200** precinct ballot tabulator.
- The **ES&S AutoMARK,** a proven ballot accessible marking system that supports audio, touchscreen and tactile keypad inputs for ballot marking.
- The **DS850** central ballot scanner for high speed tabulation of mail ballots, absentee ballots or Election Day ballots. Jurisdictions can network multiple DS850 scanners to a central reporting PC for large central count operations.
- **Election Reporting Manager** software for results consolidation and report generation.

ES&S Voting System 5.0.0.0 system components are divided into the following functional groups**:**

- **Election Management System**
- **Central Ballot Tabulator**
- **Electronic Ballot Marking Devices**
- **Precinct Ballot Tabulators**
- **Third party computing equipment and peripherals**

Depending on customer needs, a fielded voting system configuration may include some or all components described in this document.

Voting system components, including required and optional COTS equipment, software and peripherals, are catalogued in Appendix B: "ES&S Voting System Summary."

Subsystem	Device Class	Subclasses
Election Management System ○ **ElectionWare** ○ **Election Reporting Manager**	Election Management System	N/A
Precinct Ballot Tabulators ○ **ES&S DS200**	Digital Scanner	• Precinct Count Digital Scanner • Electronically Marked Paper Ballots capable (AutoMARK) • Manually Marked Paper Ballots capable
Central Ballot Tabulators ○ **ES&S DS850**	Digital Scanner	• Central Count Digital Scanner • Electronically Marked Paper Ballots capable (AutoMARK) • Manually Marked Paper Ballots capable
Ballot Marking Devices ○ **ES&S AutoMARK Voter Assist Terminal**	Voter Editable Ballot Device	• Electronically Assisted Ballot Marker • Voter Editable Ballot Device - Audio • Voter Editable Ballot Device - Visual • Accessible Voting Station
ES&S Accessories and Peripherals	N/A	N/A

Table 1.1. ES&S Voting System 5.0.0.0 voting system

System components are identified and versioned in Appendix B, "ES&S Voting System Summary."

1.1. VOTING SYSTEM OVERVIEW

Figure 1.1, following, and the document sections that follow provide a functional overview of the ES&S Voting System.

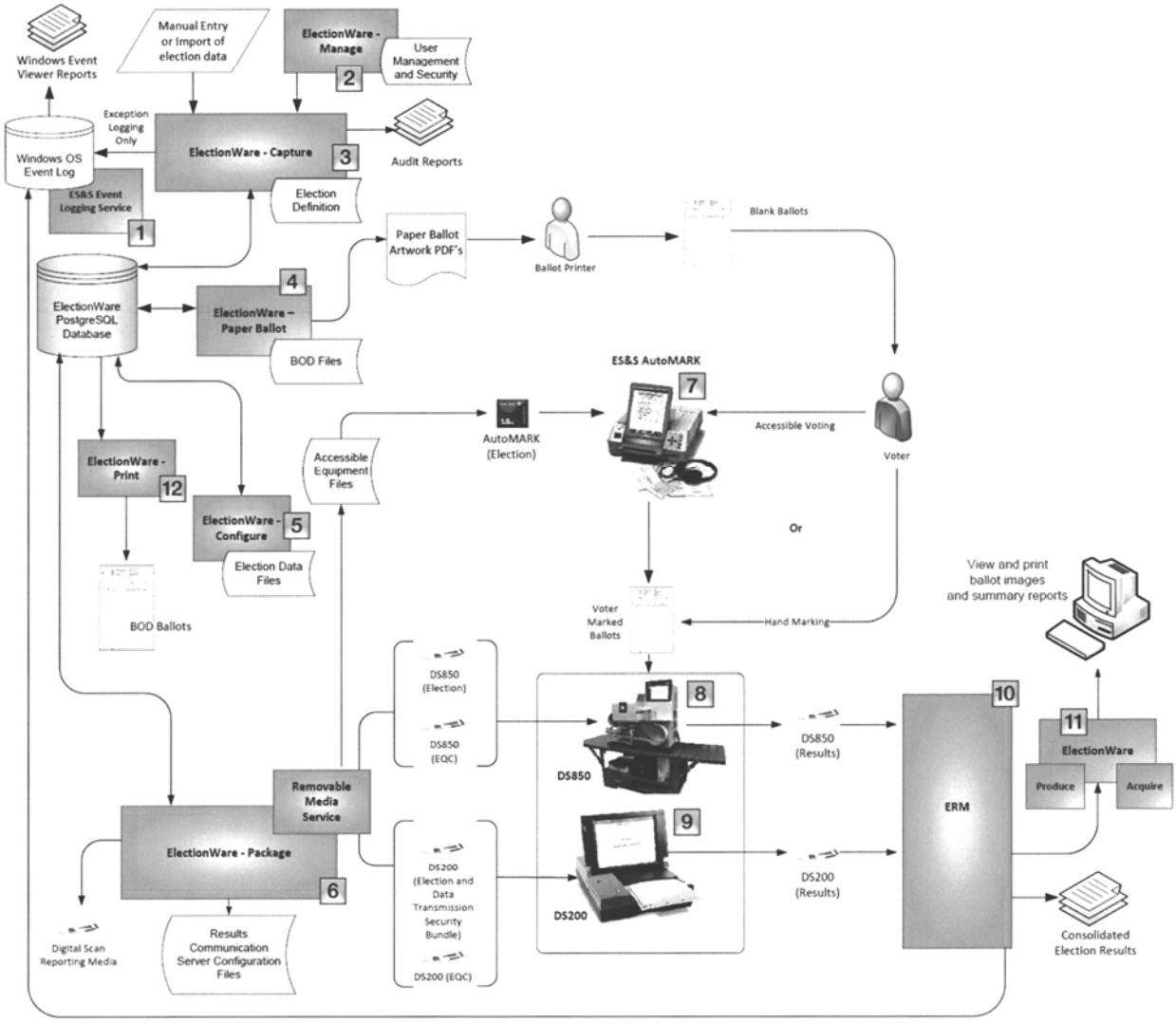

Figure 1.1. ES&S Voting System 5.0.0.0 Voting System Overview

1 Event Logging

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

2 ElectionWare - Manage

Administrators use the ElectionWare Manage module to configure ElectionWare user accounts and passwords, enter initial jurisdiction settings and manage existing elections and election templates. Initial security settings for ElectionWare are entered here.

3 ElectionWare - Capture

Using the Capture module, users add languages (including audio), language groups, configure parties, precincts and registered voters, add district types and districts, assign precincts to districts, add headings, contests and poll places, assign precincts to polling places and generate ballot styles from the Manage menu bar.

Capture's Tools menu bar enables equipment selection, sets election preferences, imports election data, imports and export ballot translations, edits election options, sets user preferences and more.

4 ElectionWare – Paper Ballot

Paper Ballot reads and converts the information configured in the jurisdiction's election database (created in Capture) into finished ballot layouts. Paper Ballot opens in an external window to enable the design and publishing of ES&S paper ballots for central count and precinct ballot scanners.

Paper Ballot creates ballot formats used by ES&S ballot services, or a third party ballot printer to mass print official ballots. Paper ballot layouts are also used by the ElectionWare Print module to generate extra Election Day ballots on demand.

5 ElectionWare – Configure

The Configure module is used to manage equipment and security settings. This module configures settings and security for digital ballot scanning and accessible voting equipment. Once equipment is configured, commands in the Tools menu create the equipment configuration files necessary to generate the election.

6 ElectionWare – Package

The Package module creates election media. Once media is created, the Package module can be used to test the generated election through automated logic and accuracy testing.

7 ES&S AutoMARK

Figure 1.2. ES&S AutoMARK

The ES&S AutoMARK Voter Assist Terminal provides assistive ballot marking for voters who are visually or physically impaired or voters who are more comfortable reading or hearing ballot content an alternative language.

The AutoMARK supports ballot navigation from the system touchscreen, physical keypad or ADA support peripheral such as a sip and puff device or two position switch. The device visually guides the voter through the ballot marking process with screen prompts and symbols. Screen controls meet all applicable guidelines for size and readability. Physical keys are shaped and positioned to provide an intuitive voting session and labeled in both Braille and text to indicate function.

The system includes a mandatory vote summary screen that requires voters to confirm or revise selections prior to marking a paper ballot.

1. Touchscreen
2. Physical control panel with Braille embossed keys.
3. Headphone and accessible device ports
4. Ballot input path
5. Control key port
6. Election programming

8 DS850

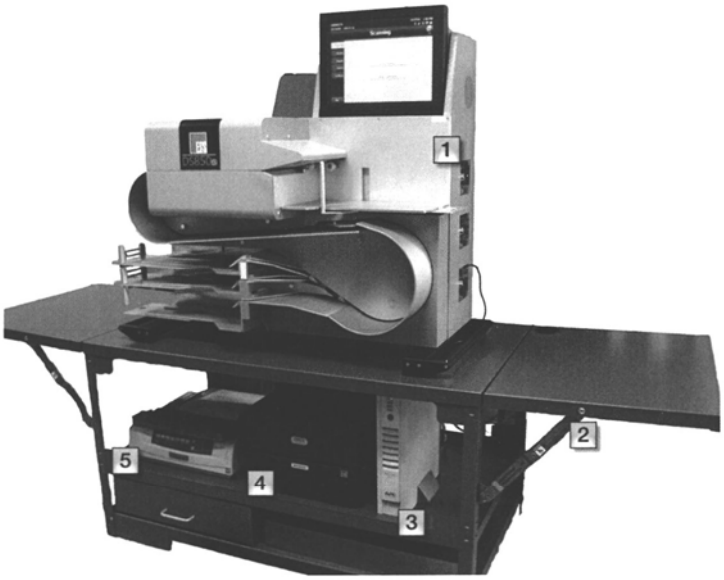

Figure 1.5. DS850

The DS850 is a high-speed, digital scan central ballot counter that uses advanced cameras and imaging algorithms to simultaneously capture voter selections on the front and back of a ballot, evaluate the results and then sort ballots into discrete bins without interrupting scanning.

A dedicated audit printer generates a continuous event log. Machine level reports are produced from a second laser printer. The scanner saves voter selections and ballot images to an internal hard disk and exports results to a USB Memory stick for processing with Election Reporting Manager.

The DS850 includes the following components:

1. DS850 Tabulator
2. DS850 Table
3. Uninterruptable Power Supply
4. Report Printer
5. Audit Printer

9 DS200

Figure 1.6. DS200

The DS200 is a paper ballot scanner designed for polling place use. Voters mark selections on a paper ballot and then insert the ballot in any orientation for immediate tabulation. Both sides of the ballot are processed simultaneously with high-resolution scanners and the resulting ballot images are decoded by a proprietary recognition engine. Once voter selections are processed, the ballot is dropped into a secure ballot box.

Product features include a 12-inch touch screen providing voters and poll worker feedback, an internal thermal printer for generating machine totals and log reports, and USB thumb drive for loading the election definition and storing results.

1. Touchscreen
2. Ballot input
3. Thermal printer access
4. Election media storage compartment

10 Election Reporting Manager

Election Reporting Manager (ERM) consolidates vote totals from multiple tabulators and generates paper and electronic reports for distribution to election workers, candidates, and the media. ERM accumulates and consolidates election results from all ES&S tabulators.

A second ERM PC can be configured as a distribution system to display scrolling results as they are read into the ERM reporting PC and distribute reports directly to media outlets over an Intranet.

11 ElectionWare – Acquire and Produce

The Acquire module automatically reads results and ballot images a data folder when results are loaded into Election Reporting Manager. Machine and results media status reports can then be printed from this ElectionWare module.

Election officials use the Produce module to:

- View and filter the list of provisional and non-provisional ballots included in loaded results
- View, save, and print HTML and XML versions of the Election Summary Results report
- View, save and print machine logs.

12 ElectionWare – Print

The Print module is used to print extra ballots for individual polling places. The Print module retrieves ballot format information from Paper Ballot, created during the Generate BOD Data process.

1.2. Functional Components and Subsystems

The ES&S Voting System 5.0.0.0 election system includes the following functional subsystems:

- **Managing Election Data**
- **Formatting Paper Ballots**
- **Configuring Ballot Handling Equipment**
- **Generating Election Media**
- **Electronic Ballot Marking**
- **Central Ballot Tabulation**
- **Precinct Ballot Tabulation**
- **Results Consolidation and Reporting**

1.2.1. Managing Election Data

Subsystem Description	Managing election data includes all tasks related to the creation and configuration of the election database, which stores all of a jurisdiction's precinct, office, and candidate information. Once an initial election database is completed, it can be recalled and edited for all following elections. System event log administration includes a series of applications that track all user and equipment actions throughout the election process.
Included Subtasks	• **User management and security setup** • **Election Management System setup and configuration** • **Jurisdiction database configuration** • **Election database configuration** • **Text and referendum configuration** • **Polling place set up** • **Merging database files for export** • **Generating reports** • **Event logging**
Operational Environment	Election Central
Included ES&S Software	• ElectionWare - Manage • ElectionWare - Capture • ES&S Event Log Service
Included ES&S System Hardware	N/A
Notes	N/A

1.2.2. Formatting Paper Ballots

Subsystem Description	This functional subsystem includes all activities related to defining the image of an digital scan ballot and populating the ballot with contest, candidate and referendum information imported from the Election Database application.
Included Subtasks	• **Importing configuration files** • **Modifying ballot format** • **Formatting style sheets** • **Configuring ballot text and graphics** • **Exporting the ballot image to a certified print service** • **Event Logging**
Operational Environment	• Election Central • Ballot Production
Included ES&S Software	• ElectionWare – Paper Ballot • ES&S Event Log Service
Included ES&S System Hardware	N/A
Notes	Mass printing requires support from ES&S printing services or an ES&S partner printer. Printed ballots must meet specifications included in the ES&S publication *ES&S Ballot Production Guide*.

1.2.3. Configuring Voting Equipment

Subsystem Description	Configuring voting equipment includes all tasks required to convert election database information into ballot definition parameters for tabulation and ballot marking equipment. Within this functional subsystem, election management software users program the ballot counting rules for a specific election – the election definition - to the memory devices used used to program tabulation equipment.
Included Subtasks	• **Import and manage election files** • **Generate ballot handling equipment files** • **Event logging**
Operational Environment	Election Central
Included ES&S Software	• ElectionWare – Configure • ES&S Event Log Service
Included ES&S System Hardware	N/A
Notes/Additional Materials	N/A

1.2.4. Generating Election Media

Subsystem Description	Generating media for ballot handling equipment includes all tasks required to convert and transfer final election configuration files from the Election Management System to portable media used to load those files to election equipment.
Included Subtasks	• **Generate media for ballot handling equipment – tabulators and accessible voting devices** • **Generate reporting media to configure reporting software** • **Event logging**
Operational Environment	Election Central
Included ES&S Software	• ElectionWare – Package • ES&S Event Log Service
Included ES&S System Hardware	N/A
Notes	N/A

1.2.5. Accessible Ballot Marking

Subsystem Description	Accessible ballot marking includes all tasks releated to preparing, testing and implementing assistive voting devices for use in a polling place environment.
Included Subtasks	• **Setting Up the Ballot Marking Device** • **Performing System Diagnostics** • **Marking Paper Ballots** • **Event Logging**
Operational Environment	• Election Central (storage, maintenance, preparation and testing) • Polling Place
Included ES&S Software	N/A
Included ES&S System Hardware	• ES&S AutoMARK Voter Assist Terminal (VAT)
Notes	N/A

1.2.6. Central Ballot Tabulation

Subsystem Description	Central ballot tabulation includes all tasks required to prepare, test and scan official ballots at a central count location.
Included Subtasks	• **Setting up the Tabulator** • **Performing System Diagnostics** • **Configuring System Settings** • **Pre-Election Testing** • **Processing Ballots** • **Output Results and Generate Reports** • **Event Logging**
Operational Environment	Election Central/Election Headquarters
Included ES&S Software	N/A
Included ES&S System Hardware	ES&S DS850 Central Ballot Tabulator
Notes	N/A

1.2.7. Precinct Ballot Tabulation

Subsystem Description	Precinct ballot tabulation encompasses the activites required to prepare, test and implement ES&S precinct ballot tabulators within a polling place environment.
Included Subtasks	• **Setting up the Tabulator** • **Performing System Diagnostics** • **Configuring System Settings** • **Pre-Election Testing** • **Opening the Polls** • **Processing Ballots** • **Closing the Polls** • **Output Results and Generate Reports** • **Event Logging**
Operational Environment	• Election Central (storage, maintenance, preparation and testing) • Polling Place
Included ES&S Software	N/A
Included ES&S System Hardware	ES&S DS200 Precinct Ballot Counter
Notes	N/A

1.2.8. Results Consolidation and Reporting

Subsystem Description	Results consolidation and reporting encompasses system functions required to gather and combine results from multiple tabulators and tabulator types, and then generate paper and electronic reports for election workers, candidates, and the media.
Included Subtasks	• **Creating the results database** • **Configuring reporting groups** • **Accumulate totals from poll-based equipment** • **Accumulate totals from central count equipment** • **Merging results from different equipment types** • **Generating reports** • **Event logging** • **Loading Results Files from ERM** • **Reviewing provisional ballots** • **View and save alternate format versions of the election summary results report using ElectionWare - Produce** • **Save and view machine log reports using ElectionWare – Produce**
Included ES&S Software	• Election Reporting Manager • ElectionWare – Acquire • ElectionWare – Produce
Included ES&S System Hardware	N/A
Notes	N/A

1.3. Operational Environment

The following sections provide descriptions of ES&S voting system operational environments and an overview of the hardware, software and communication structure for each listed environment. System hardware and software details, including required and optional COTS and proprietary equipment and software, appear in Appendix B, "Voting System Summary."

ES&S system hardware and software is designed for the following operational environments:

- **Election Central**
- **Ballot Production**
- **Polling Place**

In addition to describing the system operational environments, this section includes an overview of the voting system's communication structure.

1.3.1. Windows Server 2008 EMS Network

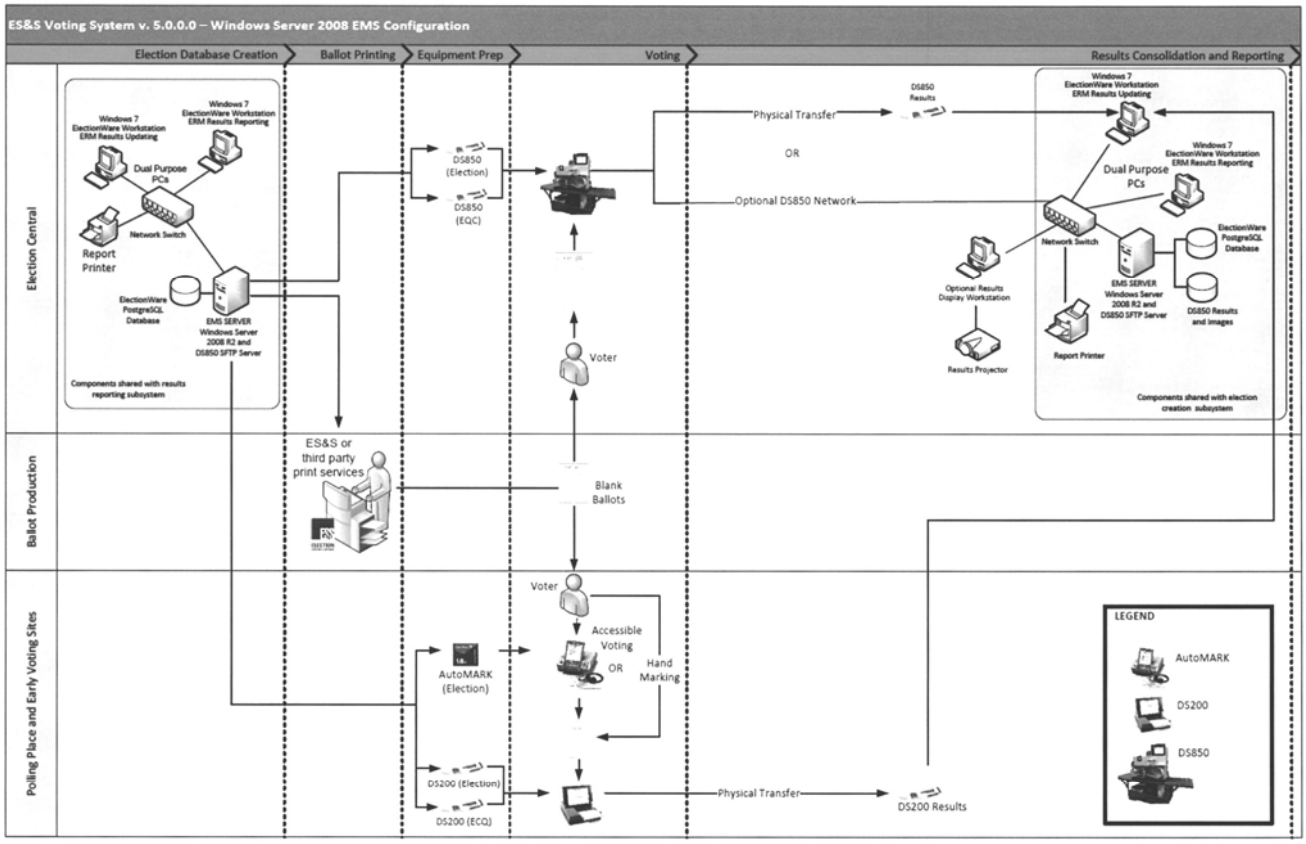

Figure 1.8. Windows Server 2008 EMS network

1.3.2. Standalone EMS Workstation

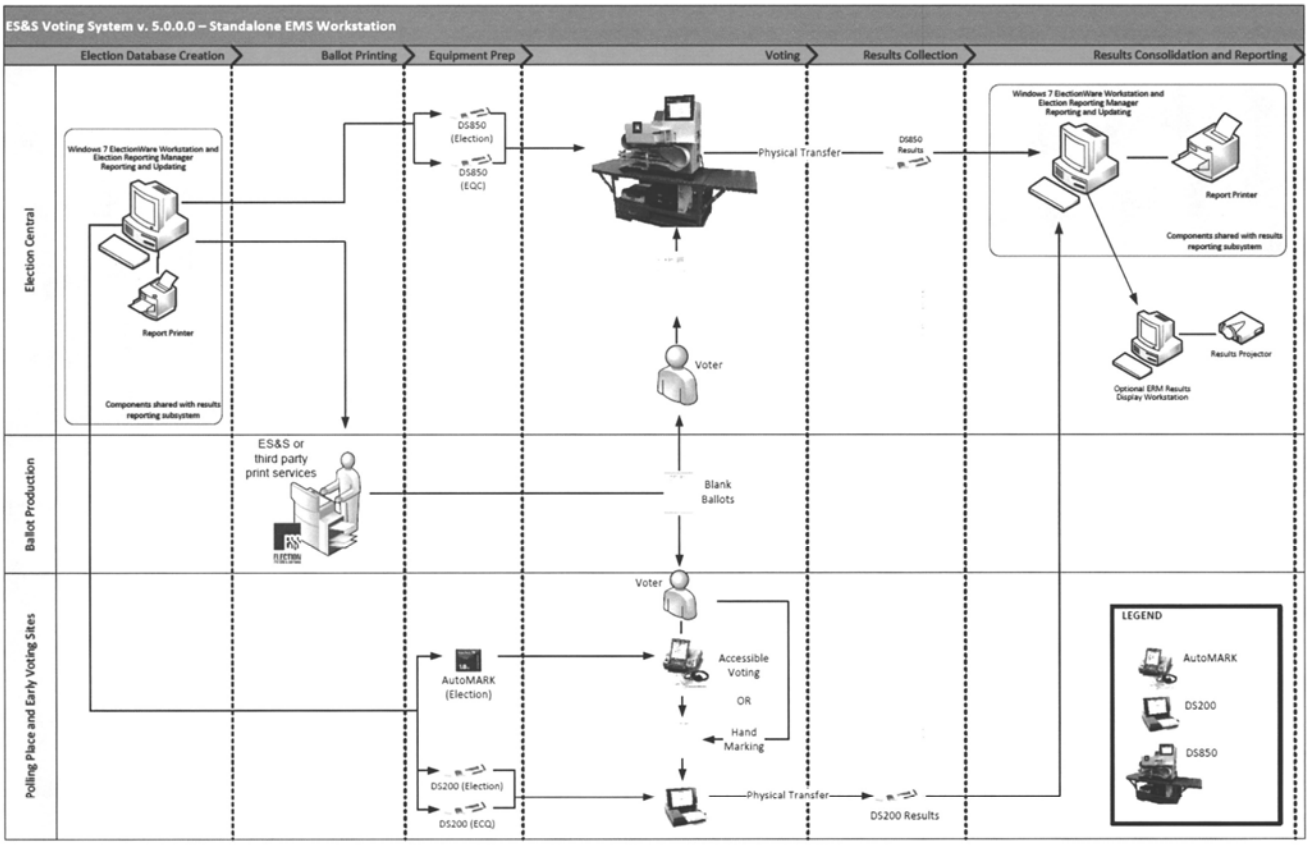

Figure 1.9. Stand-alone reporting workstation configuration

1.3.3. Election Central

Environment Description	Election Central includes all facilities and equipment required to store and maintain election tabulation and ballot marking devices, populate and safely store the master election database, program election definitions for ballot handling equipment and host all activities releated to central ballot tabulation, results consolidation and reporting.
Functions Performed	• **Managing Election Data** • **Formatting Paper Ballots** • **Configuring Ballot Handling Equipment** • **Electronic Ballot Marking (Storage, Preparation and Testing)** • **Precinct Ballot Tabulation (Storage, Preparation and Testing)** • **Central Ballot Tabulation** • **Results Consolidation and Reporting** • **Early/In-person Absentee Voting**
Included ES&S Software	• ES&S Event Log Service • ElectionWare – All Modules • Election Reporting Manager
Included ES&S System Hardware	• EMS PC • EMS Server • DS850 Results Server • Report Printer – EMS • ES&S DS850 Central Ballot Tabulator • ES&S DS200 Precinct Ballot Tabulator (Early Voting, Storage and Maintenance) • ES&S AutoMARK Voter Assist Terminal (Early Voting, Storage and Maintenance) • See Appendix B, "Voting System Summary" for additional system components and COTS items.
Included COTS Hardware and Software	• EMS PC Operating System • Communications Server Software • Report Printer • See Appendix B, "Voting System Summary" for additional specifications for COTS items.

1.3.4. Ballot Production

Environment Description	The ballot production environment outputs all evaluation, test and live election ballots for jurisdiction use. ES&S print services or an ES&S certified partner printer produces these ballots based on images formatted using ES&S election management software. The production environment itself includes all facilities and equipment required to convert ballot images supplied by EMS programmers into paper ballots that comply with the specifications of the jurisdiciton and the performance requirements for ES&S ballot marking and tabulation equipment. While the ballot itself is an assessible component of the voting system, the production environment for that ballot can vary widely. Any sufficeintly trained commercial printer with equipment capable of meeting ES&S defined ballot specifications can generate ballots that meet the test and performance specifications of ES&S ballot marking and tabulation equipment. ES&S does not require that ballot printers use specific equipment or procedures, as long as the output ballots meet specification.
Functions Performed	**Ballot Printing**
Included ES&S Software	N/A
Included ES&S System Hardware	N/A
Included COTS software	N/A
Included COTS hardware and peripherals	N/A
Notes/Additional Materials	Printed ballots must meet the paper, ink and image specifications detailed in the *ES&S Ballot Production Guide* included under TDP Section 13.

1.3.5. Polling Place

Environment Description	The polling place environment comprises the facilities and equipment required to carry out ballot marking and tabulation at the poll level.
Functions Performed	• **Ballot Marking for Voters with Disabilities** • **Polling Place Ballot Tabulation and Reporting** • **Secure Network Results Transfer**
Included ES&S Software	N/A
Included ES&S System Hardware	• ES&S DS200 Poll Based Ballot Tabulator • ES&S AutoMARK Voter Assist Terminal • See Appendix B, "Voting System Summary" for system component specifications and COTS items.
Included COTS software	N/A
Included COTS hardware and peripherals	• See Appendix B, "Voting System Summary" for specification of COTS items
Notes/Additional Materials	N/A

1.3.6. Communications Structure

The ES&S voting system supports the following network configurations:

- EMS PC workstations networked to a Windows 2008 Server.
- Multiple DS850 Central high-speed central tabulators networked to a reporting workstation.

The following sections outline the network architectures used to transfer results.

1.3.6.1. Networked Election Management System

The ES&S voting system supports an election management system networked through Windows 2008 server. When configured according to ES&S specifications, this network is a closed system that does not allow connection to the Internet or connection to external data lines. The system provides limited file sharing for EMS programmers allowing election workers to contribute content to the same election definition from different EMS workstations. All physical connections to the network are standard, physical, network connections.

Figure 1.11 illustrates a networked Election Management System.

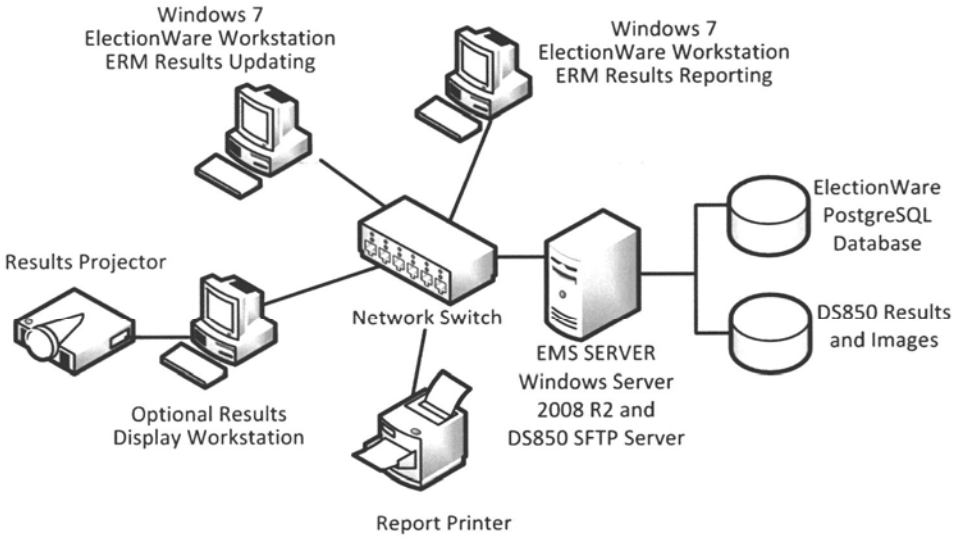

Figure 1.12. Networked Election Management System.

1.3.6.2. DS850 Reporting Network

Multiple DS850 tabulators can be networked to a central reporting PC for high-speed mass ballot counting and results consolidation. This local reporting network has no connections to the Internet or outside data lines.

Figure 1.12 illustrates a local DS850 reporting network.

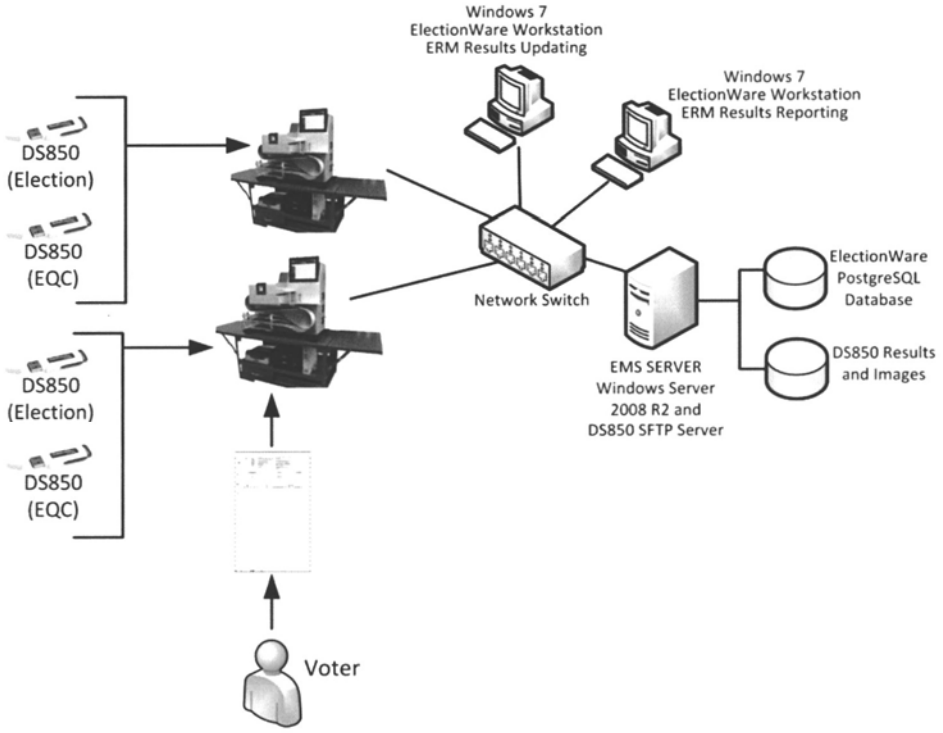

Figure 1.13. DS850 results network.

1.3.6.3. Peripheral Communication

All ES&S Voting System 5.0.0.0 system peripherals, such as printers, mice, card readers/writers and other devices - connect through standard communications ports such as USB or serial interfaces. System hardware specifications include descriptions of available ports on ES&S tabulators and ballot marking equipment.

1.4. Concept of Operation

Figure 1.13 illustrates the operational flow and system interfaces for the ES&S voting system. ES&S voting systems provide the flexibility to mix and match system hardware, software and services to achieve specific goals. ES&S advances this operating philosophy through modular design. Each piece of voting system equipment included in the voting system may be used as a stand-alone module/tabulator or as part of an integrated system.

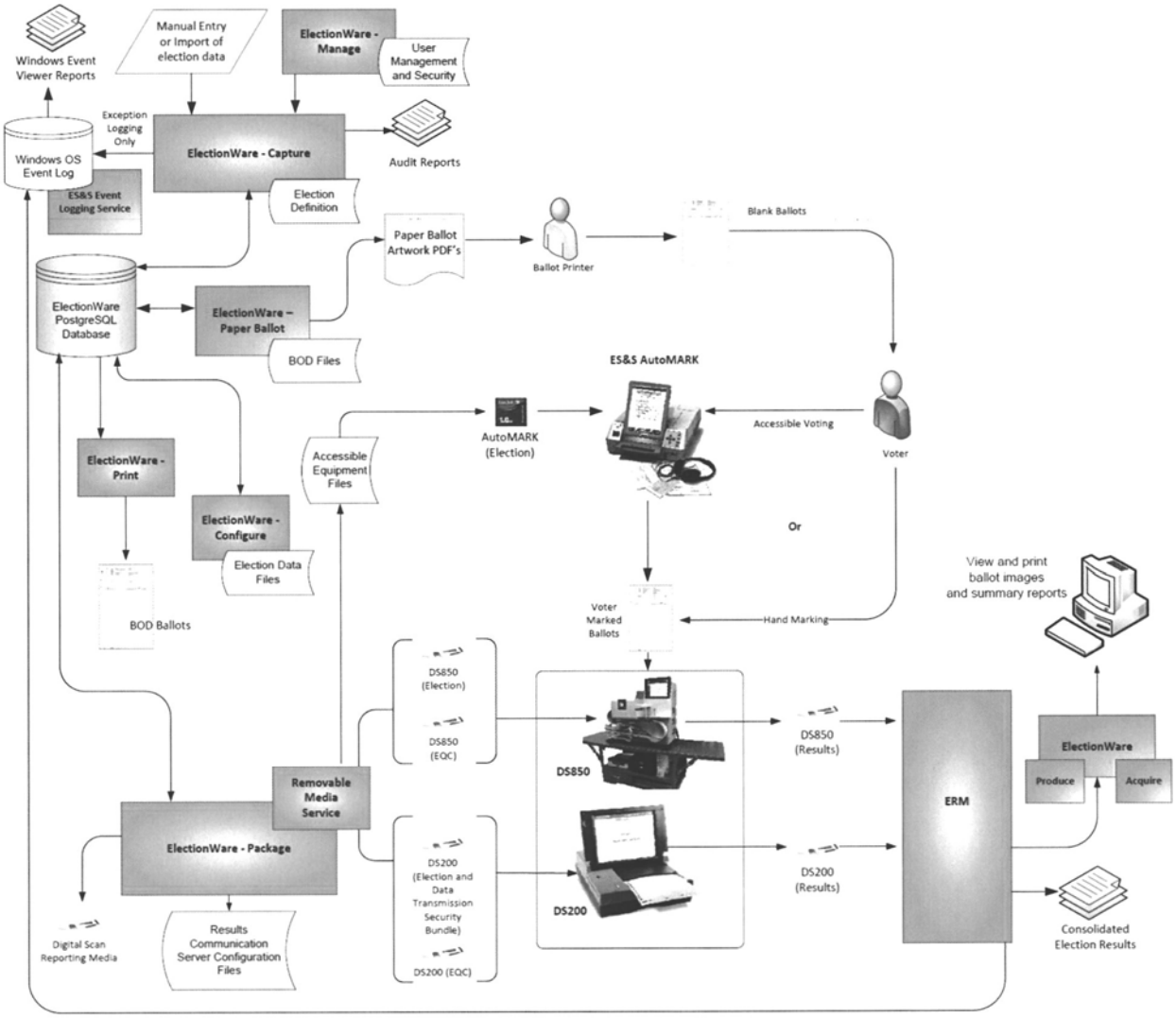

Figure 1.14. Concept of Operation

1.5. Functional and Physical Interfaces

See the diagrams under Section 1.3, "Operational Environment" and Section 1.4, "Concept of Operation," for an overview of system interfaces. External interfaces utilize an ES&S proprietary standard. ES&S *Software Design and Specification* documents include detailed internal interface descriptions for individual ES&S system modules.

1.6. COTS HARDWARE AND SOFTWARE

A list of Consumer off the Shelf (COTS) products used with the system appears in Appendix B, "Voting System Summary."

1.7. INTERFACES AMONG COMPONENTS

Interface/Means used for Information Exchanged	Public Standard
Encrypted XML File (.EML)	Interface between ElectionWare and the ES&S DS850/ES&S DS200 and AutoMARK XML files are encrypted individually or as a package with the file extension .eeff.
XML Files	Interface between ElectionWare and the SFTP Server. XML files are encrypted individually or as a package with the file extension .eeff.
XML Files	Interface between ElectionWare and ERM
Poll Place Collection XML Files	Interface between the ES&S DS850/ES&S DS200 and ERM

1.8. Benchmark Directory Listings

See below for default/recommended install locations for voting system software listed in the order the software would normally be installed upon setup and installation. Firmware for vote counting and ballot marking equipment is installed by ES&S and cannot be accessed, installed or modified by a voting system user.

Install Order	Voting System or COTS Application	Benchmark Install Directory	EMS Server with 850 Network	EMS Workstation or stand-alone	ERM Only
1	Windows 7 Professional, with SP1	Default		●	●
2	Windows Server 2008 R2, with SP2	Default	●		
3	AVG Business 2012	C:\Program Files(x86)\AntiVirus	●	●	●
4	Cerberus FTP (installed on the central count EMS server for the DS850 results network)	C:\Program Files (x86)\Cerberus LLC\Cerberus FTP Server\	●		
5	Adobe Acrobat Standard version 9.0 or better.	C:\Program Files(x86)\Adobe\Acrobat 9.0		●	●
6	RM/Cobol 12.06	C:\Program Files(x86)\LIANT\RMCOBOLv12		●	●
7	Microsoft Office Excel 2007 or greater	C:\Program Files(x86)\Microsoft Office\Office14\Xlstart		●	
8	ES&S Event Log Service	C:\Program Files(x86)\Election Systems And Software\Event Log Service		●	●
9	Removable Media Service	C:\Program Files(x86)\Election Systems And Software\Removable Media Service		●	●
10	Election Reporting Manager (ERM)	C:\apps\ess\urs		●	●
11	VAT Preview	C:\Program Files(x86)\AutoMARK		●	
12	ElectionWare	C:\Program Files(x86)\Election Systems And Software\ElectionWare	●	●	

2. System Performance

2.1. Performance Characteristics

This section provides an overview of system performance characteristics by product. Detailed performance characteristics for each product in the system appear in Appendix C, "Product Specification Sheets." System limitations appear in Appendix A, "Voting System Limitations."

2.1.1. Ballot Target Limits for Paper Ballots

The ES&S voting system supports the following ballot formats.

Ballot Size	Targets Per Inch	Voting Positions Per Row x Column = Ballot Targets	Supported Tabulators:
8 1/2 X 11"	4	38 X 24 Columns = 912/side	DS200 and DS850
	5	50 X 24 Columns = 1200/side	DS200 and DS850
8 1/2 X 14"	3	41 X 24 Columns = 984/side	DS200 and DS850
	4	50 X 24 Columns = 1200/side	DS200 and DS850
	5	65 X 24 Columns = 1560/side	DS200 and DS850
8 1/2 X 17"	3	50 X 24 Columns = 1200/side	DS200 and DS850
	4	62 X 24 Columns = 1488/side	DS200 and DS850
	5	81 X 24 Columns = 1944/side	DS200 and DS850
8 1/2 x 19"	3	56 X 24 Columns = 1344/side	DS200 and DS850
	4	70 X 24 Columns = 1680/side	DS200 and DS850
	5	91 X 24 Columns = 2184/side	DS200 and DS850

2.2. Quality Attributes

See Appendix C, "Product Specification Sheets," for product quality attributes.

2.2.1. Reliability

ES&S systems are designed with a target Mean Time Before Failure (MTBF) rate of 163 hours.

2.2.2. Maintainability

ES&S designs all voting system equipment for ease of preventative and corrective maintenance. All ES&S tabulators meet or exceed EAC maintainability requirements.

- **Mean Time to Repair:** The Mean Time to Repair (MTTR) measures the average time required to perform a corrective maintenance task. Corrective maintenance task time measures only active repair time and excludes logistic or administrative delays. Corrective maintenance may require on site repair. The mean-time to repair ES&S systems and components is sufficient, in combination with the Mean Time Before Failure (MTBF), to achieve the required availability.
- **Maximum Repair Time (MMAX):** ES&S designs central scanners and precinct equipment to provide a less than five percent probability that an unscheduled maintenance action will require more than 30 minutes to complete. If a technician cannot repair a component in less than 30 minutes, a replacement component is placed on standby near ES&S scanners during the equipment's operating period.
- **Maintenance Ratio (MR):** Maintenance Ratio is the ratio of total maintenance hours (MH) to total operating hours (OH). MH is equal to the sum of the scheduled and unscheduled maintenance hours spent on all components that make up the system. OH includes the nominal time of system operation, including the time required to prepare the system for an election and the time required for post-election operations. The target maintenance ratio for ES&S systems is 0.25 MH/OH.

2.2.3. Availability

ES&S' target availability during normal operation for voting system hardware is 99 percent.

2.2.4. Usability

The ES&S voting system is designed to meet or be quickly modified to the needs of every election jurisdiction in the United States. The system accounts for thousands of election permutations and variables based on local and State regulations and incorporates functionality built to specific customer requests and requirements. While ES&S strives to create the most pleasant and intuitive user experience possible through deeply considered system design, we recognize that sacrifices to usability are sometimes required to meet our goal of comprehensive system utility. To ensure that our users can maximize their understanding of the system, ES&S enhances usability and accessibility through Heuristic evaluation, intelligent system design, comprehensive training programs and administrative support services. See Appendices D-E for results of ES&S usability testing for voter facing equipment.

2.2.4.1. System Features and Design

The ES&S voting system provides election officials and ES&S internal users with an array of options for managing election and ballot data, counting votes and reporting results. ES&S develops all systems to the design requirements of *VVSG Volume I, Section 3* and *VVSG Volume I, Appendix D* and considers additional human factors beyond the scope of VVSG requirements in selecting screen color and font selection, using familiar Windows conventions for menus and user interfaces, providing 'WYSIWYG' ballot editing tools, determining the shape and color of tangible system controls and designing logical work flows for end-to-end election processing.

2.2.4.2. Training

ES&S provides efficient and effective training with a core curriculum developed over four decades of installing and servicing new voting systems. ES&S provides core election day and pre-election courses and then tailors specific classes to meet the unique needs of each client jurisdiction.

Classroom instruction includes audio, visual and hands-on demonstrations and exercises – specific to students' responsibilities. Students receive a training manual that features visual and step-by-step instructions. Customized job aids and testing materials may be developed to meet the individualized needs of the students.

ES&S offers refresher training after first use, and always evaluate the effectiveness of every class in order to continually refine and improve a customized training program.

2.2.4.3. Support Services

ES&S Account Managers, Customer Support Representatives, and Field Service Technicians are extensively trained and have real-world experience in the implementation, service, and support of election systems.

2.2.5. Portability

ES&S voting equipment is designed for its intended purpose. Voting equipment designed for use at polling places is light and easily transportable. ES&S central tabulators are designed for speed and durability and are not designed for high portability. See Appendix C, "Product Specification Sheets," for product dimensions and weight.

2.2.6. Safety

See Appendix C, "Product Specification Sheets," for ES&S product safety considerations.

2.2.7. Security

Each ES&S product is designed with specific security features and procedures that contribute to the overall security of the voting system. The following table contains general descriptions of the security features and procedures for each product. Product manuals and security specifications provide detailed security descriptions by product.

Product	Security Features/Description
ES&S DS850	• See Appendix C, "Product Specification Sheets," for DS850 security considerations.
ES&S DS200	• See Appendix C, "Product Specification Sheets," for DS200 security considerations.
ES&S AutoMARK	• See Appendix C, "Product Specification Sheets," for ES&S AutoMARK security considerations.
ES&S Event Log Service	• ES&S Event Log Service logs user actions for election management applications. • ES&S Event Log Service runs in the background logging system events to the COTS Windows Event Viewer. • Election officials use ES&S Event Log Service to monitor system activity. • ES&S Event Log Service records all user actions in supported software as a continuous audit log. Election officials can format and print reports based on the log.
ElectionWare	• ElectionWare requires users to enter a valid username and password prior to gaining access to the application. The username and passwords are stored in an encrypted database. Strong password methodology is utilized which requires the password to be at least 8 characters long and include at least one number, one upper case letter, one lower case letter and contain no spaces. • Depending on a user's access rights, ElectionWare limits selections in the Manage module. Unavailable menu selections do not appear in the application interface. • ElectionWare saves a record of all user actions to the system audit log. The Username of the logged in user also appears in the log. • System security for ElectionWare limits casual access to system files but security also depends on sound practices at the election office. Officials are required to implement a strong physical and procedural security plan that limits access to ElectionWare to authorized personnel only. Election officials should also make sure that the PCs running ElectionWare remain secure before and after each election. • ElectionWare does not offer any data entry feature that can be used to alter programming.
Election Reporting Manager	• Election Reporting Manager saves a record of all significant user actions to the ERM system audit log and also writes all audit log entries to the secure Windows Event Log. • Access to the ERM application is controlled by the System Administrator assigned access rights as documented in the ES&S System Security and System Hardening documents • System security for Election Reporting Manager limits access to system files and election results but system security also depends on sound practices at the election office. Officials should limit access to Reporting Manager and election results to authorized personnel only. Election officials should also make sure that the PC running Reporting Manager remains secure before and after each election. Access to election results generated in Reporting Manager should be regulated and officials should compare election reports generated in Reporting Manager to scanner totals in order to make sure that final results are consistent with the results from ballot scanning equipment. • Officials should retain all paper ballots and election results USB Memory Devices to ensure system security and provide audit trail for forensic investigation.

2.2.8. Privacy

2.2.8.1. Voting System Hardware

See Appendix C, "Product Specification Sheets," for privacy features of ES&S voting equipment.

2.2.8.2. Election Management System

No voter information is stored to the ES&S Voting System 5.0.0.0 voting system software; ensuring voter privacy and security.

2.2.9. Continuity of Operation

2.2.9.1. Voting System Hardware

See Appendix C, "Product Specification Sheets," for backup and recovery features of ES&S voting equipment.

2.2.9.2. Election Management System

Frequent backups and the use of an uninterruptable power source ensure continuity of operation for Election Management System software.

2.3. Design Constraints, Applicable Standards and Compatibility Requirements

2.3.1. Design Constraints

2.3.1.1. ES&S DS850

In addition to supporting Voluntary Voting System Guidelines (VVSG), the ES&S DS850 was designed to:

- Support the same election rules and ballot formats as the DS200 precinct ballot tabulator
- Share as much code as possible with the DS200 Precinct ballot tabulator application
- Share as many operating system components as is possible with the DS200 precinct ballot tabulator.
- Handle folded ballots with minimal jams.
- Store ballot images for ballots that have completed processing.

2.3.1.2. ES&S DS200

In addition to supporting Voluntary Voting System Guidelines (VVSG), the DS200 was designed to:

- Support the ballot box designed for ES&S' legacy precinct ballot scanner, the Model 100, which dictated the rail (feet) of the unit, diverter connector, overall width and length dimensions of the DS200
- Support the PEB communication pack used by the ES&S iVotronic DRE precinct tabulator so that votes could be consolidated within the DS200. This functionality is not supported in this release.
- Position the DS200 to support the RoHS lead-free standards. This functionality is not fully supported in this release.

2.3.1.3. ES&S AutoMARK

In addition to supporting the VVSG, the ES&S AutoMARK addresses human engineering considerations of disabled voters. The design includes audio output and Braille keypads to accommodate vision-impaired voters, and a touch pad and sip n puff input to accommodate voters with limited physical mobility.

2.3.1.4. Election Management System

ES&S Election Management System software is designed to support the election rules and standards of the 2005 VVSG.

2.3.2. Applicable Standards

Product	Applicable Standards
ES&S DS850	See Appendix C, "Product Specification Sheets," for DS850 design standards.
ES&S DS200	See Appendix C, "Product Specification Sheets," for DS200 design standards.
ES&S AutoMARK	See Appendix C, "Product Specification Sheets," for AutoMARK design standards.
ElectionWare	• *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)* • *The Java Programming Language by Ken Arnold, James Gosling, David Holmes* • *ES&S Java Coding Conventions. See ES&S document "Development Practices and Coding Standards*
Election Reporting Manager	• *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)* • *RM/Cobol for Windows version 7.0 – Language Reference Manual* • *CodeBridge for Windows version 7.0 – Calling Non-Cobol Subprograms*

2.3.3. Compatibility Requirements

System requirements appear in Appendix B, "Voting System Summary."

APPENDIX A VOTING SYSTEM LIMITATIONS

This Appendix describes the practical limitations of the ES&S voting system.

Table of Changes		
Revision	**Date of Change**	**Description of Change**
1.0	11.14.2011	Initial document
2.0	3.25.2012	Added a footnote to the "Maximum candidate/counters allowed per precinct," limitation.
3.0	5.2.2012	Updated footnotes in Section 1.
4.0	5.23.2012	Updated Section 1 with additional limitations.
5.0	6.5.2012	Updated based on internal review.
6.0	6.12.2012	Updated the value for "Maximum count for any precinct element." Updated the value for "Minimum number of parties allowed" for a primary election based on internal review.
7.0	6.25.2012	Removed references to optical scan ballots.
8.0	8.15.2012	Updated to remove components no longer included with the current system configuration.
9.0	8.29.2012	Added supported languages to the system limitations table under Section 1.
10.0	12.18.2012	Removed a reference to unsupported network functionality from Section 2.2.

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3. Election management Software Limits **4**

3.1. ElectionWare 4

3.2. Election Reporting Manager 4

1. VOTING SYSTEM LIMITATIONS

The following table summarizes practical limitations of the ES&S voting system.

System Characteristic	Boundary or Limitation	Limiting Component
Max. precincts allowed in an election	At least 9900	ERM
Max. count for any precinct element	500,000 (65,500 from any tabulator media)	ERM report (ERM results import)
Max. candidates allowed per election	Depends on election content (limited by 21,000 maximum counters)[1]	ERM
Max. contests allowed in an election	Depends on election content (limited by 21,000 maximum counters)[2]	ERM
Max. counters allowed per precinct	Limits candidates and contests assigned to a precinct to 1,000[3]	ERM
Max. contests allowed per ballot style	200 or # of positions on ballot	N/A
Max. candidates (ballot choices) allowed per contest	175	ERM (database create)
Max. number of parties allowed	General election: 75 Primary election: 20 (including nonpartisan party)	ERM (database create)
Max. 'vote for' per contest	98	ERM (database create)
Ballot formats	All paper ballots used in an election must be the same size and contain the number of response rows.	Ballot scanning equipment
Max. Ballot Styles	9900	ERM
Max. District Types/Groups	20	ERM
Max. districts of a given type[4]	40	ERM
Supported Languages	• English • Spanish • Chinese • Korean • Japanese	System Configuration

Table A.1.1. Voting system limitations

[1] Calculation of the number of counters must include a minimum of 4 counters for each contest, 3 overhead (overvote, undervote, precincts counted) and at least 1 candidate. Additional contest candidates each add a counter. If some precincts are defined as Absentee, a fourth overhead counter (absentee precincts counted) must be added to each contest. The number of statistical counters (Ballots Cast, Registered voters) must be added to the contest counters to determine the total counters.

[2] Example of maximum contest calculation if all contests had 2 candidates (5 counters each, 3 overhead counters + 2 candidates) and there were 10 statistical counters (i.e. Ballots Cast-Total, Republican, Democratic, Libertarian, Nonpartisan and Registered Voters-Total, Republican, Democratic, Libertarian, Nonpartisan. (21000-20)/5 = 4196 or (counter limit – statistics x 2)/number of counters/contest = number of contests.

[3] Contest counters are calculated as indicated in footnote 1, but two counters must be added for each statistical counter defined for the precinct. There are a minimum of 3 statistic counters assigned to each precinct (six added counters), "Ballots Cast," "Registered Voters" and "Ballots Cast Blank."

[4] Excludes the Precinct Group which contains all precincts.

2. System Component Limitations

Limitations and boundaries are listed where component limit is not cataloged or controlled by the values listed in Section 1 of this document.

2.1. Paper Ballot Limitations

1. The paper ballot code channel, which is the series of black boxes that appear between the timing track and ballot contents, limits the number of available ballot variations depending on how a jurisdiction uses this code to differentiate ballots. The code can be used to differentiate ballots using three different fields defiened as: Sequence (available codes 1-26,839), Type (available codes 1-30) or Split (available codes 1-40).
2. If Sequence is used as a ballot style ID, it must be unique election-wide and the Split code will always be 1. In this case the practical style limit would be 26,000.

2.2. ES&S DS200 Additional Limitations

1. The ES&S DS200 configured for an early vote station does not support precinct level results reporting. An election summary report of tabulated vote totals is supported.

2.3. AutoMARK Voter Assist Terminal

ES&S AutoMARK capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, Election Management System and ballot tabulator limitations define the boundaries and capabilities of the AutoMARK system as the maximum capacities of the ES&S AutoMARK are never approached during testing.

3. ELECTION MANAGEMENT SOFTWARE LIMITS

3.1. ELECTIONWARE

ElectionWare capacities exceed the boundaries and limitations documented for ES&S voting equipment and election reporting software. For this reason, ERM and ballot tabulator limitations define the boundaries and capabilities of ElectionWare system.

3.2. ELECTION REPORTING MANAGER

1. Election Reporting Manager requires a minimum monitor screen resolution of 800x600.
2. ERM Database Create allows 1600 Precincts Per Ballot Style.
3. There is a limit of 3510 precincts in the precincts counted/not counted display.
4. There is a limit of 3000 precincts in the precincts counted/not counted scrolling display.
5. Contest/Precinct selection pop up display limited to 3000 contests/precincts.
6. Non-English characters are not supported in ERM. This has to do with the creation of the XML results file out of ERM.
7. ERM's maximum page size for reports is 5,000 pages.
8. Generating a District Canvass Report without first properly creating a .DST file can result in inaccurate totals reports and inconsistent report formatting.

Field Limit Report Specification

ElectionWare Element	Limiting Component	Entry Length Warning Level	Component Limit	Device Screen or Report Containing the ElectionWare Element
Precinct Name	DS200	30	30	Precinct Selection screen - Character wraps on reports
Precinct ID	DS850	4	4	Clear Precinct Results
			28	Clear Precinct Results screen
			28	Confirmation screen
			20	Print Results Reports Screen
			29	Scan Ballots screen
			30	Search Precinct screen
			28	Select Precinct screen
Precinct Long Name	DS850	24	24	Select reports screen
			36	Select Precinct screen
			34	Select Precinct search screen
			42	Not Processed/Processed Reports
Poll Place Name	DS200	25	25	DS200 Screens and reports (characters wrap on reports)
Poll Place Short Name	DS850	23	23	All screen headers
Contest Title	DS200	40	40	Voter Exception Screens
	ERM	40	47	Screens and reports
Contest Short Name	DS200	40	255	Reports - characters wrap on report tape
Contest Long Name	DS850	39	39	Not Processed Batch/Bin Report (Long)/Processed with Write-ins Batch/Bin Report (Short)/Preview Screen
				Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen
				Processed with Write-ins Batch/Bin Report (Long) /Preview Screen
				Zero Report/ Election Detail Results Report/Election Public Results Report and Preview Screens
Candidate Short Name	DS200	48	48	Reports - additional characters truncate
Candidate Long Name	DS850	45	45	Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen
				Zero Report/ Election Detail Results Report
Precicnt Label	DS200	20	20	DS200 screens - entrly limited to 20 characters
				DS200 Reports - entrly limited to 20 characters
	DS850	20	20	Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen - entrly limited to 20 characters
				Processed with Write-ins Batch/Bin Report (Long) /Preview Screen - entrly limited to 20 characters
Election Name	DS200	25	255	DS200
	DS850	25	32	850 Load election
			124	Not Processed Batch/Bin Report (Long)/Processed with Write-ins Batch/Bin Report (Short) /Preview screen
			124	Not Processed Batch/Bin Report (Short)/Processed with Write-ins Batch/Bin Report (Short)/Processed Batch/Bin Report (Short) /Preview screen
			124	Precincts by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen
			124	Precincts Processed Report/Not Processed/Preview Screen
			124	Processed Batch/Bin Report (Long)
			124	Processed with Write-ins Batch/Bin Report (Long)/Preview screen
			79	System Readiness Report
			42	Title Bar
			124	Zero Report/Election Detail Results Report/Election Public Results Report and Preview screens
Election Short Name	DS200	25	25	All screens

Field Limit Report Specification

ElectionWare Element	Limiting Component	Entry Length Warning Level	Component Limit	Device Screen or Report Containing the ElectionWare Element
Jurisdiction Name	DS200	25	25	All screens
	DS850	25	127	Not Processed Batch/Bin Report (Long)/Processed with Write-ins Batch/Bin Report (Short)/Preview Screen
			127	Not Processed Batch/Bin Report (Short)/Processed with Write-ins Batch/Bin Report (Short)/Processed Batch/Bin Report (Short)/Preview Screen
			127	Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen
			127	Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report and preview screen
			127	Precincts Processed Report/Not Processed Preview Screen
			127	Processed Batch/Bin Report (Long)
			127	Processed with Write-ins Batch/Bin Report (Long)
			127	Zero Report/Election Detail Results Report/Election Public Results Report and Preview Screen

End

APPENDIX B VOTING SYSTEM SUMMARY

The following document summarizes the configurations and capabilities of the ES&S Voting System 5.0.0.0 voting system and lists the software and equipment required to configure the system.

Table of Changes		
Revision	**Date of Change**	**Description of Change**
1.0	11.15.2011	Initial Document
1.1	1.25.2012	Updated functional diagrams under Section 1 Updated system configuration descriptions under section 1.4. Updated for readability. Updated anti-virus versioning. Updated modem card model identifiers and added a USB modem bank device under Section 2.2.
2.0	2.2.2012	Added the syslog server to the network software listed under section 2.1.
3.0	3.25.2012	Updated the component intstall chart under Section 1.4.2 to match information included in Appendix H. Expanded detail on some COTS software components.
4.0	4.18.2012	Updated system diagrams.
5.0	4.20.2012	Updated supported Delkin USB Flash drives for the DS200 under Section 2.2 to include 1 GB and 2 GB sizes.
6.0	10.1.2012	Removed components from the system configuration. Updated versioning for Event Log Serivce and Removable Media Service.
7.0	12.18.2012	Removed references to unsupported network functionality.
8.0	1.10.2012	Moved the install location system for Microsoft Excel. Updated component listings and versioning. Updated Section 1.3.2 to include omitted components. Updated flash drive support for the DS200 and DS850 to remove an unsupported drive brand.
9.0	1.29.2013	Updated AutoMARK hardware versioning to include the A-300 hardware configuration.

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I. INTRODUCTION

A. SCOPE

This document summarizes the theory of operation, included components and declared functionality for the ES&S voting system.

B. SYSTEM DESCRIPTION

The ES&S Voting System 5.0.0.0 voting system includes equipment and software that provides scalable, end-to-end election system functionality for voting jurisdictions with wide-ranging requirements.

Voting System Name	**ES&S Voting System v. 5.0.0.0**
Manufacturer	Election Systems & Software, LLC
System Version	ES&S Voting System 5.0.0.0
Voting System Test Laboratory	Wyle Labs
Requested EAC Certification Number	N/A
Nature of System	New Voting System – not previously certified
Applicable Standard	VVSG 1.0
Certification Application Submission Date	N/A

ES&S voting system components are designed to fulfill the following system functions:

- **Election database creation, ballot formatting and equipment coding management**
- **Central ballot tabulation**
- **Electronic ballot marking**
- **Precinct ballot tabulation**
- **Results consolidation and reporting**

1. FUNCTIONAL DIAGRAMS

The functional diagrams on the following pages illustrate the voting system's supported functional and physical configurations.

1.1. WINDOWS SERVER 2008 EMS NETWORK

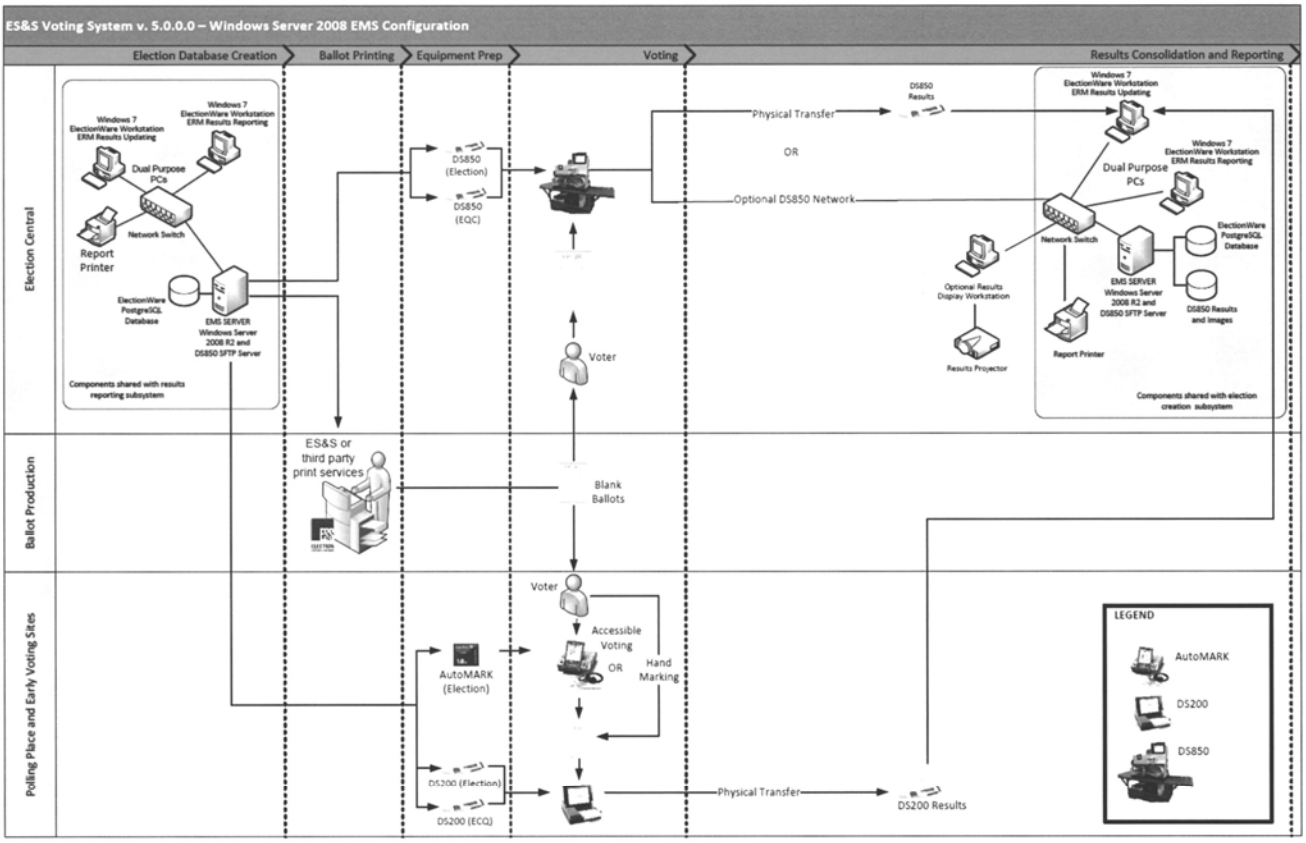

Figure B-1.1. Windows 2008 Server EMS network

1.2. STANDALONE EMS WORKSTATION

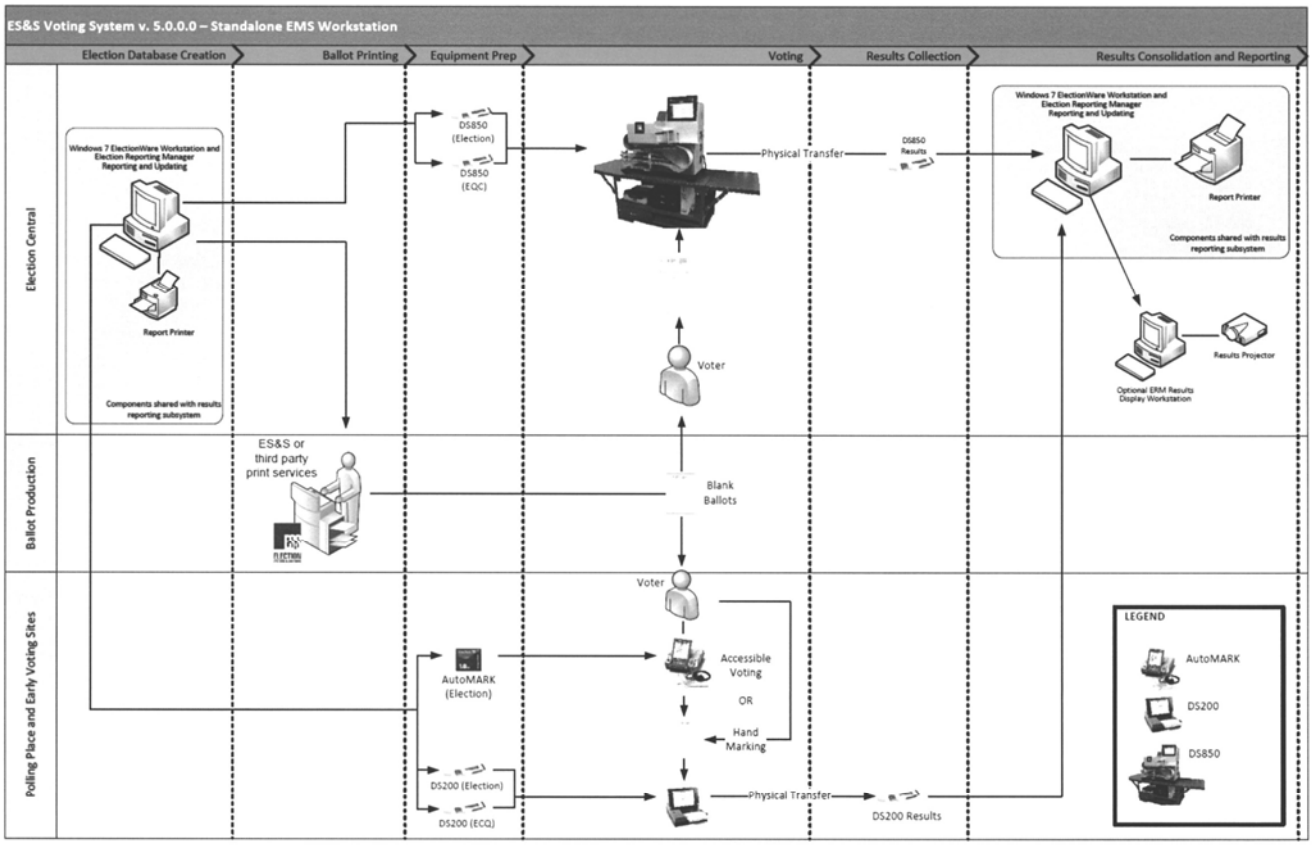

Figure B-1.2. Standalone reporting workstation configuration

1.3. EQUIPMENT CONFIGURATIONS

The ES&S voting system supports the following computer, system, and equipment configurations.

Computer Configurations:

1. **Election Management System (EMS) Workstation –** Microsoft Windows 7-based PC set up in one of the following manners
   - Full election support (Stand-alone configuration)
   - ElectionWare/ERM support only
2. **EMS Client Server** – Microsoft Windows 2008 Server that is set up to support one or more client EMS Workstations and an optional DS850 results network.

System Configurations: System configurations use one or more of the following Computer Configurations

1. **Windows Server EMS Network**– Networked system that combines a Client/Server EMS system with an optional results network for DS850 central ballot scanners..
2. **Standalone system -** Each computer configuration is a single, stand-alone, EMS workstation used for eleciton preparation and reporting.

Equipment Configurations: Each System Configuration can be set up to support one or more of the following:

1. **DS850 Central Tabulator**
2. **DS200 Precinct Tabulator**
3. **AutoMARK Voting Assist Terminal**

1.3.1. Required Election Management System Hardware

Table 1.1 identifies the hardware required for each computer configuration listed in this document.

Hardware Component	Full Support EMS - Standalone	EMS Workstation	EMS Server
Computer System #1 –Standalone system or Client workstation - Windows 2008 network or Standalone system	●	●	
Computer System #2 – Windows 2008 Server and DS850 results server.			●
Report Printer	●	●	●
CompactFlash Reader	●	●	

Table B-1.1 Voting systemcomputer hardware requirements.

1.3.2. Required Election Management System Software

Table 1.2 identifies the ES&S and commercially available software components required for each computer configuration listed in this document.

Software Component	Full Support EMS Workstation	ElectionWare/ERM EMS Workstation	EMS Client Server with DS850 results network
Microsoft Windows 7 Professional, 64-bit SP-1	●	●	
Microsoft Server 2008, SP-2			●
Microsoft Patches	●	●	●
Adobe Acrobat Standard, v. 9.0	●	●	
Micro Focus RM/Cobol Runtime 12.06	●	●	
ES&S Removable Media Service (RMS)	●	●	
ES&S EventLog Service (ELS)	●	●	
ES&S Election Reporting Manager (ERM)	●	●	
ES&S ElectionWare - client	●	●	
ES&S ElectionWare - server	●		●
VAT Preview	●	●	
Cerberus FTP			●

Table B-1.2. Voting system software requirements.

2. Required Components

2.1. System Software

Product	SW/FW Version	Manufacturer	Description
EMS Workstation – Desktop or Notebook	N/A	N/A	PC workstation for standalone use or the Windows 2008 Server environment.
Required Software			Required for all EMS components
Windows	Windows 7 Professional, 64-bit, SP-1	Microsoft	– Operating System
AVG Business	2012	AVG	– Anti-Virus.
Removable Media Service (RMS)	1.4.0.0	ES&S	– Supports graceful installation and removal of results media
ES&S Event Log Service (ELS)	1.5.0.0	ES&S	– Provides custom event log reports from the Windows Event Log.
ElectionWare - Client	4.1.0.0	ES&S	Election database, ballot and election equipment configuration
VAT Preview	1.8.1.0	ES&S	– Required for configurations including AutoMARK
Adobe Acrobat Standard[1]	9.0	Adobe	– Ballot PDF generation
Election Reporting Manager (ERM)	8.6.0.0	ES&S	Election results report management
RMCOBOL	12.06	Liant	– COBOL Runtime
Windows Workstation	N/A	N/A	Non-certified business PC.
Microsoft Excel[2]	2007 or better	Microsoft	– Spreadsheet Software

[1] Acquired from OEM or licensed dealer.

[2] Acquired from OEM or licensed dealer.

Product	SW/FW Version	Manufacturer	Description
Windows 2008 EMS Server	N/A	N/A	Server for Windows 2008 Server network environment.
Required Software			Required for all components
Windows	2008 Server Standard EditionR2, SP-2	Microsoft	– Operating System – acquired from OEM or directly from Microsoft
AVG Business	2012	AVG	– Anti-Virus
ElectionWare - Server	4.1.0.0	ES&S	Ballot and election equipment configuration
Opitonal DS850 Results Network Software			Results Server for Windows 2008 Server network environment. Runs on the same physical server as the Windows 2008 EMS network server and requires all software listed for the Windows 2008 Server.
Cerberus FTP	4.0	Cerberus LLC	– Secure, FTP server

Table B-2.1 Voting system software components

2.2. Election Management System Hardware

Product	Versioning	Manufacturer	Description
EMS Workstation – Desktop or Notebook	N/A	N/A	PC workstation for the Windows Server environment or standalone use.
Processor	N/A	N/A	– Dual Core
RAM	N/A	N/A	– 2 GB minimum, 4 GB recommended
Hard Disk	N/A	N/A	– 150 GB
Keyboard	N/A	N/A	– N/A
Mouse	N/A	N/A	– N/A
Monitor	N/A	N/A	– 1280x800 minimum resolution
CD/DVD reader	N/A	N/A	– 16x or faster
USB Ports	N/A	N/A	– Minimum 2 USB 2.0 ports
Report Printer	N/A	N/A	– Standard Printer
Windows 2008 Server	N/A	N/A	Host system for Windows EMS Server configurations
Processor	N/A	N/A	– Quad Core
RAM	N/A	N/A	– 4 GB minimum
Hard Disk	N/A	N/A	– 320 GB
Keyboard	N/A	N/A	– N/A
Mouse	N/A	N/A	– N/A
Monitor	N/A	N/A	– 1280x800 minimum resolution
CD/DVD reader	N/A	N/A	– 16x or faster
USB Ports	N/A	N/A	– Minimum 2 USB 2.0 ports
Ethernet Port	N/A	N/A	– N/A
Report Printer	N/A	N/A	– Standard Network Printer

Table B-2.2 PC hardware

2.3. VOTING SYSTEM HARDWARE

Product	Versioning	Manufacturer	Description
DS200			
System Firmware	2.7.0.0	ES&S	Application Firmware for precinct based vote tabulation
Scanner Firmware	2.22.0.0	ES&S	– Board level Firmware
Power Management Firmware	1.2.4.0	ES&S	– Board level Firmware
System Hardware	1.2	ES&S	DS200 Voting System Hardware
Compact Flash Memory Card	N/A	Delkin	– Supported sizes include 1 GB
USB Memory Stick	N/A	Delkin	– Supported sizes include 512 MB, 1 GB, 2, GB, 4 GB, 8 GB
Plastic Ballot Box	1.3	ES&S	– Plastic Ballot receptacle
Metal Ballot Box	N/A	ES&S	– Metal ballot receptacle
DS850			
System Firmware	2.4.0.0	ES&S	Application Firmware for precinct based vote tabulation
System Hardware	1.0	ES&S	DS850 Voting System Hardware
Compact Flash Memory Card	N/A	Delkin	– Supported sizes include 1 GB
USB Memory Stick	N/A	Delkin	– Supported sizes include 512 MB, 1 GB, 2, GB, 4 GB, 8 GB
Report Printer	N/A	OKI	– B430dn Laser Report Printer
Audit Printer	N/A	OKI	– Microline 420 Dot Matrix Printer

Product	Versioning	Manufacturer	Description
ES&S AutoMARK			
System Firmware	1.8.1.0	ES&S	Application Firmware for HAVA compliant ballot marking system
Printer Engine Board (PEB)	1.70	ES&S	– Board Level Firmware
Scanner Interface Board (SIB)	1.43	ES&S	– Board Level Firmware
Ultra	8.0.1	ES&S	– Board Level Firmware
WinCE	5.00.20	Microsoft	– Operating System
System Hardware	1.0	ES&S	Hardware revision for AutoMARK model A-100-00
	1.1	ES&S	Hardware revision for AutoMARK model A-200-00
	1.3	ES&S	Hardware revision for AutoMARK model A-300-00
Compact Flash Memory Card	N/A	SanDisk/Toshiba	– Supported sizes include 512 KB, 1 GB, 2GB
Headphones	N/A	AVID	– Stock Headphones

Table B-2.3 Voting system hardware

APPENDIX C PRODUCT SPECIFICATION SHEETS

The following document summarizes the configurations and capabilities of the ES&S Voting System 5.0.0.0 voting system and lists the software and equipment required to configure the system.

Table of Changes		
Revision	**Date of Change**	**Description of Change**
1.0	11.14.2011	Initial Document
2.0	04.17.2012	Updated the document identifier in the document footer.
3.0	06.25.2012	Updated battery specifications.
4.0	8.13.2012	Removed components from the system configuration.

Contents

Appendix C Product Specification Sheets.....1

C-1 DS850
C-2 DS200
C-3 ES&S AutoMARK

SPECIFICATIONS

Performance

- **Expected Speed:** 365 11-inch ballots per minute or 235 19-inch ballots per minute. Approx. 8640 11-inch ballots/hour or 7200 19-inch ballots per hour.[1]
- **Maximum Speed:** Optimal test speed is Approx. 11,500 11" ballots/hour or 8870 19" ballots per hour.[2]
- **Hopper Capacity:** Input Hopper: 480 standard sized ballots Output Hopper: 480 standard sized ballots, Outstack Hoppers: 150 standard size ballots.
- **Memory:** 1 TB HDD holds Approx. 5 million ballot images and related data.
- **Maximum Ballot Styles:**.9990 precincts, 40 ballot styles per precinct in a ballots by style election.
- **Processing Frequency:** Between 14 and 18 full size batches per hour for 19" and 11" ballots, respectively.

Ballot Target Capacity

Ballot Size	Targets Per Inch	Max Ballot Targets
8 1/2 X 11"	4	912/side
	5	1200/side
8 1/2 X 14"	3	984/side
	4	1200/side
	5	1560/side
8 1/2 X 17"	3	1200/side
	4	1488/side
	5	1944/side
8 1/2 x 19"	3	1344/side
	4	1680/side
	5	2184/side

Quality Attributes

- **Reliability:** Mean time before failure (MTBF) exceeds 163 hours
- **Maintainability:** Likelihood unscheduled corrective action will require more than 30 minutes to complete:<5%
- **Target Maintenance Ratio (MR):** Maintenance Hours/Operating Hours = 0.25 MR

Safety

- Protective guards around all rollers and diverters (flippers) to reduce pinch hazards.
- Safety Interlocks that disable the transport if either the camera or rear access panel are opened.
- Protective covers of the all power supplies.
- Lift assist cylinders on the camera lid and rear access panel to prevent these from dropping on the user.
- A stepper motor driven transport which more quickly detects jam situations and quickly brings the transport to a safe stop.
- Large carrying handles for lifting and positioning the machine.
- Skid-resistant pads to keep unit from moving during operation.

Security

- Lockable, sealable, clear-view access doors for all ports, as well as the power switch and cord connection.
- System functions will not execute if improperly configured.
- Pass code protection for all critical functions, including Election Administration, Processing Modes, System and Hardware Maintenance, and Results functions.
- Supervisor functions are limited to the controls provided in the system menus.
- Digital Signature and password security provides a high level of security on data transferred between Election Management Software and the DS850.
- The DS850 requires the retention of paper ballots and proper election procedures by election officials as a redundant means of providing system security.

Privacy

- N/A – Central Count

Environmental

- **Size (WxDxH):** 41"x18"x37" (104 cm x46 cm x94 cm)
- **Weight:** Approx. 200 lbs (91 kg)

Backup

- **Battery Type:** N/A
- **Backup Time:** N/A
- Uninterruptable Power Supply (UPS) provides power to complete any interrupted run, save data, initiate a controlled shutdown, disposition the data on re-start. A backup generator is required for extended backup support.

Supplies

- **Memory Devices:** SanDisk 512, 4, or 8 GB or Delkin 2 GB
- **Report Printer:** OKI B430dn Laser Report Printer
- **Audit Printer: OKI** Microline 420 Dot Matrix Printer

Connectivity

- **Network Connection:** Local networking to a central reporting PC capable.
- **Local Ports:** (1x) High Speed USB 2.0.

Applicable Standards

- *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)*
- *ASI Election Programming System Handbook*
- *AIS Ballot Production Manual*
- *AIS EPS file format documents*
- *Performance and Test Standards for Punch Card, Marksense and Direct Recording Electronic Systems*
- *Technical Support Inc. 'C' Programming Guidelines*
- *Linux System Architecture*

Specifications are subject to change without notice.

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[1] Assuming 60 seconds for loading and unloading ballot batches.

[2] "Maximum Speed" based on a test environment with jogged and ready ballots in full-size batches and 3 users prepping, running and removing the ballots, as well as no jams or mis-feeds.

ELECTION SYSTEMS & SOFTWARE, LLC

USA
11208 John Galt Blvd
Omaha, NE 68137
Phone: 800.247.8683

CANADA
1200 West 73rd Ave
Suite 350
Vancouver, BC V6P 6G5
Phone: 604.261.6313, x129

VOTER REGISTRATION
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683
Phone: 402.970.1220

Election Systems & Software
MAINTAINING VOTER CONFIDENCE. ENHANCING THE VOTING EXPERIENCE.

SPECIFICATIONS

Performance

- **Expected Speed:** 2 to 3 voters per minute. Approx. 2,300 ballots per terminal over the course of a 15-hour counting period.[1]
- **Maximum Speed:** 5 ballots per minute. 153 ballots per hour. Approx 2300 ballots for a 15-hour day.[2]
- **Ballot Box Capacity:** 2,800 14-inch paper ballots.
- **USB Memory Capacity:** 512 KB standard, 8 GB maximum. The number of ballot records within capacity depends on the size of the election.
- **Maximum Ballot Styles:** .9,990 precincts, 40 ballot styles per precinct in a ballots by style election.
- **Processing Frequency:** Approx. 20 seconds per voter.

Ballot Target Capacity

Ballot Size	Targets Per Inch	Max Ballot Targets
8 1/2 X 11"	4	912/side
	5	1200/side
8 1/2 X 14"	3	984/side
	4	1200/side
	5	1560/side
8 1/2 X 17"	3	1200/side
	4	1488/side
	5	1944/side
8 1/2 x 19"	3	1344/side
	4	1680/side
	5	2184/side

Quality Attributes

- **Reliability:** Mean time before failure (MTBF) exceeds 163 hours
- **Maintainability:** Likelihood unscheduled corrective action will require more than 30 minutes to complete:<5%
- **Target Maintenance Ratio (MR):** Maintenance Hours/Operating Hours = 0.25 MR

[1] Estimated maximum throughput in a real world environment – where mismarked, torn or folded ballots are occasionally rejected.
[2] Maximum throughput in a test environment with a single user feeding ballots into the machine with no rejections.

Safety

- Rounded edges on all exposed plastic surfaces.
- No sharp edges or metal exposure.
- External power supply minimizes exposure to shock.
- Once secured to the ballot box, the DS200 cannot be moved.

Security

- Locking front panel prevents access to the scanner, ballot box and USB Flash Drive that contains election programming.
- System functions will not execute if improperly configured.
- Locked panel secures the operating mode controls during voting.
- The election definition or system firmware cannot be overwritten once a precinct official installs the election program.
- Supervisor functions are limited to the controls provided in the system menus.
- Digital Signature and password security provides a high level of security on data transferred between Election Management Software and the DS200.
- The DS200 requires the retention of paper ballots and proper election procedures by election officials as a redundant means of providing system security.

Privacy

- Secure voting booths with privacy screens are available from ES&S.
- If a voter selects more than the allowed number of candidates in a contest, the DS200 returns the ballot to the voter for revision.
- Once a voter confirms selections, the DS200 deposits the counted ballot in a secure, locked ballot box.

Environmental

- **Unit Size (WxDxH):** 14"x16"x5" (36 cm x41 cm x13 cm)
- **Unity Weight:** Approx. 25 lbs With internal battery (11 kg)
- **Storage and Transport Case Size (WxDxH):** 22.5"x17"x11" (57 cm x43 cm x28 cm)
- **Storage and Transport Case Weight:** 7 lbs (3kg)
- **Ballot Box Size – with DS200 Installed (WxDxH):** 25"x22.5"x38" (64 cm x57 cm x97 cm)
- **Ballot Box Weight – with DS200 Installed:** Approx. 70 lbs (32 kg)
- **Ballot Box Size – Storage and Transport (WxDxH):** 25"x22.5"x38" (64 cm x57 cm x97 cm)
- **Ballot Box Weight – – Storage and Transport:** Approx. 45 lbs (21 kg)

Backup

- **Battery Type:** Lithium-ion, 18 V, 4300mAh or 18.5 V, 4400 mAh
- **Backup Time:** More than 2 hours of continuous use on full charge.

Supplies

- **Memory Devices:** SanDisk 512 KB, 4, or 8 GB or Delkin 2 GB
- **Marking Device:** BIC Grip Roller ball pen (.7mm) - **Part# 6100**
- **Integrated Printer:** Seiko Thermal Printer LTPV-345

Connectivity

- **Local Ports:** (2x) High Speed USB 2.0, (1x) RJ-11 network port.

Applicable Standards

- *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)*
- *ASI Election Programming System Handbook*
- *AIS Ballot Production Manual*
- *AIS EPS file format documents*
- *Performance and Test Standards for Punch Card, Marksense and Direct Recording Electronic Systems*
- *Technical Support Inc. 'C' Programming Guidelines*
- *Linux System Architecture*

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ELECTION SYSTEMS & SOFTWARE, LLC

USA
11208 John Galt Blvd
Omaha, NE 68137
Phone: 800.247.8683

CANADA
1200 West 73rd Ave
Suite 350
Vancouver, BC V6P 6G5
Phone: 604.261.6313, x129

VOTER REGISTRATION
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683
Phone: 402.970.1220

Election Systems & Software
MAINTAINING VOTER CONFIDENCE. ENHANCING THE VOTING EXPERIENCE.

SPECIFICATIONS

Performance

- **Expected Speed:** Estimated 1.5 minutes for a sighted voter or 2.5 minutes for a voter with low or no vision.
- **Maximum Ballot Marking Speed:** 2.5 minutes per ballot.[1]
- **Throughput Capacity:** N/A. The ES&S AutoMARK processes a single ballot at a time.
- **CF Card Memory Capacity:** 512 KB standard, 2 GB maximum.
- **Maximum Ballot Styles:** 6,400
- **Processing Frequency:** 1-20 minutes per voter. Estimated average is 8 ballots per hour.

Ballot Target Capacity

Ballot Size	Targets Per Inch	Max Ballot Targets
8 1/2 X 11"	4	912/side
	5	1200/side
8 1/2 X 14"	3	984/side
	4	1200/side
	5	1560/side
8 1/2 X 17"	3	1200/side
	4	1488/side
	5	1944/side
8 1/2 x 19"	3	1344/side
	4	1680/side
	5	2184/side

Quality Attributes

- **Reliability:** Mean time before failure (MTBF) exceeds 163 hours
- **Maintainability:** Likelihood unscheduled corrective action will require more than 30 minutes to complete:<5%
- **Target Maintenance Ratio (MR):** Maintenance Hours/Operating Hours = 0.25 MR

[1] Filling all voting positions.

Safety

- Hardware design ensures that both operator and voter are protected from exposure to dangerous voltages, overheating and fire, sharp corners, and other possible hazards.
- System quality assurance procedures ensure that defects in design and construction that can result in personal injury or equipment damage are detected and corrected before voting systems and components are placed into service.
- Meets or exceeds applicable requirements of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Part 1910.

Security

- Operating Software provides security access controls to limit or detect access to critical system components and to guard against loss of system integrity, availability, confidentiality, and accountability.
- System functions are only executable in the manner and order intended, and only under the intended conditions.
- Control logic prevents ballot marking if any preconditions to this function have not been met.
- Hardware is designed to protect against tampering during system repair, or interventions in system operations, in response to system failure.
- System access during equipment preparation, testing and operation is limited by access code.
- Security safeguards cannot be bypassed or deactivated during system installation or operation by the user.

Privacy

- Available privacy shield and AutoMARK table provides a private and secure voting environment.
- An optional ballot transport sleeve hides the ballot during transfer between the marking device and tabulator.

Environmental

- **Unit Size – in use (WxDxH):** 20.8"x26.0"x17.6" (36 cm x41 cm x13 cm)
- **Unit Size – configured for transport or storage (WxDxH):** 20.8"x26.0"x7.5" (36 cm x41 cm x13 cm)
- **Unit Weight:** 48 lbs (11 kg)

Backup

- **Battery Type:** Lithium-ion, 7.4 V, 11,000 mAh.
- **Backup Time:** More than 2 hours of standard use.[2]

Supplies

- **Memory Devices:** Compact Flash Card: SanDisk or Toshiba 512 KB, 1 GB, 2 GB.
- **Headphones:** AVID 3.5mm headphones
- **Print Cartridge:** HP Inkjet **ES&S part #87002**

Connectivity

- **Network Connection:** N/A
- **Local Ports:** (1x) Standard Compact Flash Card, (1x) 3.5mm headphone jack, (1x) accessible device port.

Applicable Standards

- *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)*
- *National Election Code Standards*
- *Americans with Disabilities Act*
- *ES&S AutoMARK Operating Manuals*
- *ES&S AutoMARK System Functionality Description*

Specifications are subject to change without notice.

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[2] 8 voting sessions per hour with the spit and wipe feature deactivated

ELECTION SYSTEMS & SOFTWARE, LLC

USA
11208 John Galt Blvd
Omaha, NE 68137
Phone: 800.247.8683

CANADA
1200 West 73rd Ave
Suite 350
Vancouver, BC V6P 6G5
Phone: 604.261.6313, x129

VOTER REGISTRATION
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683
Phone: 402.970.1220

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Appendix D Common Industry Format for Usability Test Reports

This appendix includes ES&S usability evaluations for ES&S voting equipment.

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Election Systems & Software
MAINTAINING VOTER CONFIDENCE. ENHANCING THE VOTING EXPERIENCE.
EXPERIENCE RELIABILITY SECURITY INNOVATION
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

ISO/IEC 25062 Common Industry Format for Usability Test Report

ES&S AutoMARK Voter Assist Terminal (VAT)

Version 1.X

Tested by:

Christopher Fletcher C.U.A.
April, 2009

Date Prepared: April 30, 2009

Prepared by: Christopher Fletcher

Address inquiries to:

Steve M. Pearson
Phone: 402-593-0101
Email: smpearson@essvote.com
Address: 11208 John Galt Boulevard, Omaha, NE. 68137

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The document sections referenced below contain Election Systems and Software, Inc. (ES&S) confidential information, which is provided for the sole purpose of permitting the recipient, to evaluate the ES&S Voting System submitted herewith. The following sections are designated as “Proprietary and Confidential” by Election Systems & Software.

Document Section	Description
Entire Document	CIF Usability Test Results and Methodology

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Executive Summary

A summative usability test was conducted to evaluate the effectiveness, efficiency, and satisfaction of registered voters when they filled out a paper ballot and cast that ballot into the ES&S AutoMARK Voter Assist Terminal (VAT).

The ES&S AutoMARK VAT provides accessible ballot navigation and ballot marking for voters with vision and mobility impairments. Audio ballot support assists voters who are more comfortable reading or hearing ballot contents to cast their vote independently and privately.

Fourteen participants participated in the Accessibility study. Each participant performed standard voting tasks using an AutoMARK VAT.
The mean task completion time for all 14 participants was 9.36 minutes for making their selections on the AutoMARK VAT and casting their vote. The user group had a base accuracy 98.05% and an unassisted task completion rate of 64%. There were 5 dependent variables; these were task completion rate, base accuracy score, time to task completion, voter confidence and SUS score.

A questionnaire was also administered to participants after they cast their ballot, which resulted in a mean score of 64.62 based on the standard method of the System Usability Scale (SUS) and a 4.6 confidence score.

The test focused on evaluating the total number of correct votes and the number of ballots cast without any errors. The tasks were designed for the correct recording of the ballot selections while ensuring both independence and privacy.

- Table 1 -Summary Performance Results by User Type

User Type	Number of Participants Completing the Ballot	Base Accuracy Score (%)	Voting Time Mean	Voter Confidence Score Mean	Summative Usability Score Mean
Accessible Voter	13 of 14 (92.8%)	98.05%	9.36 Minutes	4.61538	64.6153

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Introduction

Full Product Description

The ES&S AutoMARK Voter Assist Terminal Version 1.6.0.0

The ES&S AutoMARK Voter Assist Terminal Version provides accessible ballot navigation and ballot marking for voters with vision and mobility impairments. Audio ballot and multi-language support assists voters who are more comfortable reading or hearing ballot contents in an alternative language to cast their vote independently.

Interconnected touch screen and keypad controls are the main interfaces for ballot navigation. Either system can be used interchangeably to navigate the ballot at any time. Touch-screen navigation meets all applicable Voting System guidelines for text size and readability while the physical keypad was designed and tested with significant contributions from special needs groups. Physical key arrangement and shape provide intuitive voting. Braille and printed text labels describe each key's function.

Figure 1. The ES&S AutuoMark Voter Assist Terminal

ES&S AutoMARK
Technical Overview – Physical Characteristics

Dimensions	**Operational** • **Width –** 20.8 inches • **Depth –** 26.0 Inches • **Height –** 17.6 Inches **Closed** • **Width –** 20.8 inches • **Depth –** 26.0 Inches • **Height –**7.5 Inches **Case** • **Width –** 26 inches • **Depth –** 34 Inches • **Height –** 14 Inches
Weight	• 48 lbs with internal battery
Memory	• **Type –** Compact Flash 2 • **Memory Type –** Flash • **Capacity –** 256 MB

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Display	• **Type –** TFT – resistive touch screen • **Diagonal Size –** 15 inches • **Viewing Area (Width) –** 8.9 inches • **Viewing Area (Height) –** 11.9 inches • **Equivalent PC Screen Specification –** XGA • **Screen Resolution (Horizontal) –** 768 • **Screen Resolution (Vertical) –** 1024 • **Color Depth –** 64k • **Display Brightness -** ≥250

Table 2 ES&S AutoMARK physical

ES&S AUTOMARK
TECHNICAL OVERVIEW – STORAGE AND OPERATING ENVIRONMENT

Storage	• 50 to 104 degrees Fahrenheit • Between 10% and 85% non-condensing humidity
Operation	• -4 to 140 degrees Fahrenheit • Between 10% and 50% non-condensing humidity

Table 3 ES&S AutoMARK Storage and Operating

ES&S AUTOMARK
TECHNICAL OVERVIEW – AUDIO SUBSYSTEM

Type	• Stereo
Cord Length	• 6 feet
Connector	• ¼″ and ½″ (3.5mm) headphone jack
Expected Life	• 10 years
Synthesized Speech Speed	• 0 – 250 words per minute

Table 4 ES&S AutoMARK Power

ES&S AUTOMARK
TECHNICAL OVERVIEW – POWER SUPPLY

Input Power Voltage	• 93-264 VAC
Input Power Frequency	• 45-66Hz
North American Line Cord	• 6 feet

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Battery Hold-up Time (min.)	• 2 hours

Table 5 ES&S AutoMARK Power Specifications

ES&S AUTOMARK
TECHNICAL OVERVIEW – BATTERY

Battery Type	• Lithium Ion
Battery Hold-up Time (min.)	• 2 hours
Number of Cells	• 10
Useful Voltage Range	• 7.2 to 8.4 VDC

Table 6 ES&S AutoMARK Battery

ES&S AUTOMARK
TECHNICAL OVERVIEW –SPEECH

Application	• Eloquence speech synthesis program
Supported Languages (Synthesized)	• English • Spanish • Chinese • Korean • Japanese
Supported Language (Real voice .wav file)	• any

Table 7 ES&S AutoMARK Speech Specifications

Intended User Population

The ES&S AutoMARK is designed to support voters with low vision or no vision, voters with physical/dexterity impairments, voters with reading impairments and voters who are more comfortable viewing or listening to ballot contents presented in an alternate language.

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Assistive Technologies Supported

The ES&S AutoMARK provides voters with vision and mobility disabilities the tools to privately cast a paper ballot.

The terminal's zoom and high-contrast display options, audio ballot and Braille embossed keypad provide full support for voters with vision impairments. An available port for a sip-n-puff device, foot pedal, or other two-position switch

facilitates unassisted voting for voters with mobility issues.

Exhibit 2 Sip and Puff device

The ES&S AutoMARK records selections on the same paper ballot used by every voter at the polling place ensuring privacy and anonymity during ballot counting. The terminal is an assistive device that does not tabulate ballot selections.

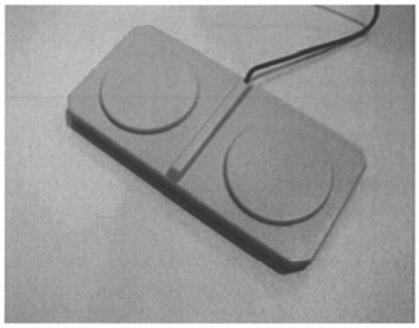

Exhibit 3 Two-position foot pedal

Support for Voters with No Vision / Low Vision

The ES&S AutoMARK zoom and high contrast display options provide assistance for voters with low vision. After a voter navigates a complete ballot, the terminal generates a summary of selections in display and audio formats that the voter must approve before marking the final ballot. This ballot summary provides the opportunity to review and edit selections before committing votes to paper.

Voters who use the ES&S AutoMARK's display ballot select their options behind a standard privacy screen to prevent onlookers from viewing the ballot display.

Screen and Volume Controls

Voters can touch the ZOOM In / Out button on any screen to increase and decrease the size of the displayed text. Selecting the HIGH CONTRAST option on any screen toggles the display between high contrast mode – white text on a black background – and normal contrast – color – mode.

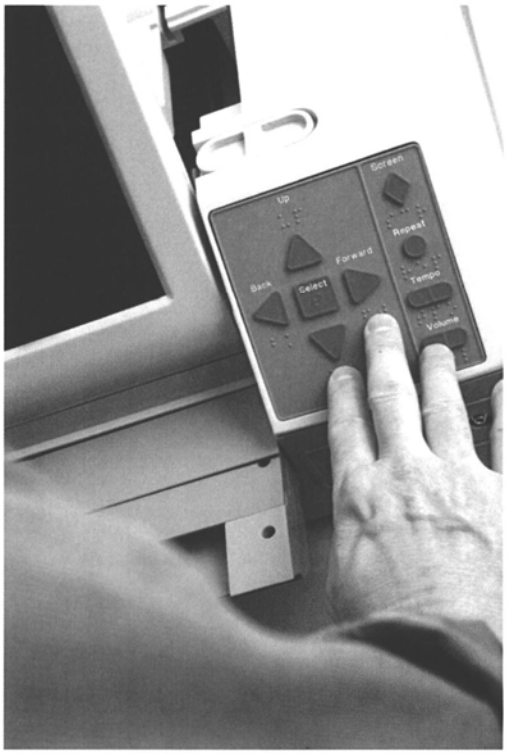

Exhibit 4 Voter using audio ballot controls

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The touch screen and physical navigation buttons – **Exhibit 4**, following – are interconnected. Voters may use either system to navigate the ballot at any time. The touch screen navigation options meet all applicable guidelines for text size and readability, and the physical keypad has been designed and tested with significant contributions from special needs groups. The keys are arranged and shaped to provide an intuitive voting session. Braille and printed text labels describe each key's function.

- Arrow keys are used to indicate up, down, left, and right.
- The square key serves as an "enter" key.
- The diamond-shaped key turns the screen on and off for audio only voting.
- The round key repeats the last audio prompt.
- Two sets of long oval keys control the volume and tempo of audio files.

Voters can easily change ballot selections by navigating back to the appropriate contest and selecting the change.

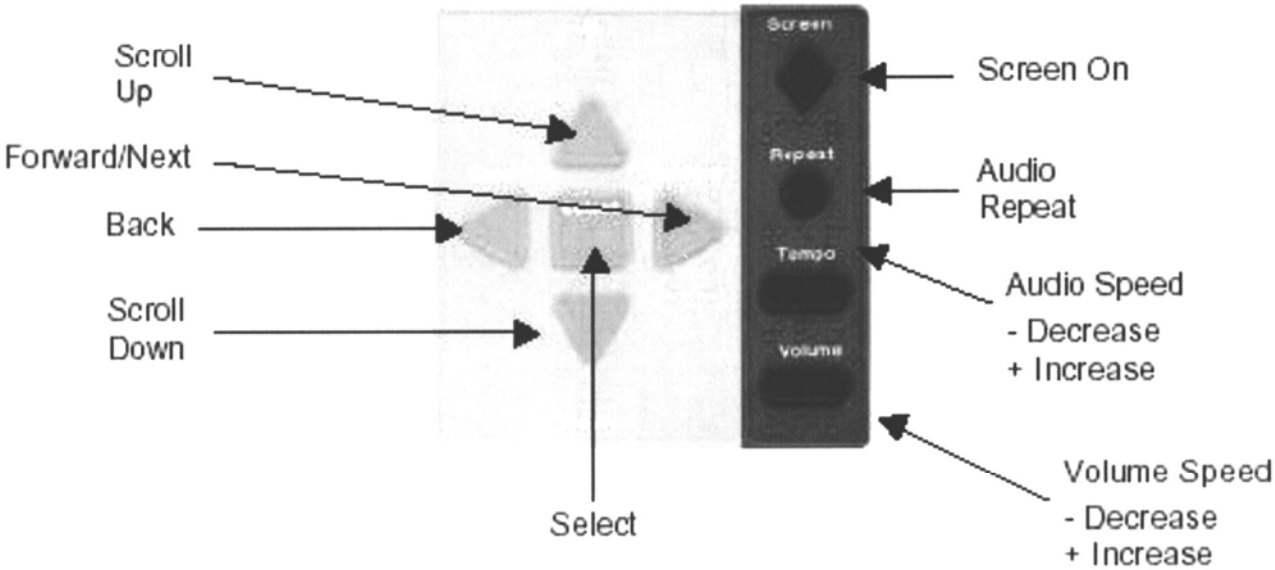

Exhibit 5 ES&S AutoMARK audio controls

Intended Environment

The ES&S AutoMARK was intended for use in any facility typically used as a polling station.

Type of Work Supported

The ES&S AutoMARK facilitates accessible ballot navigation and ballot marking for voters with vision and mobility impairments. Audio ballot and multi-language support assists voters who are more comfortable reading or hearing ballot contents in an alternative language to cast their vote independently.

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Test Objectives

The goal of this summative usability test for voting systems is to identify and measure failures, not to diagnose their cause. The focus is on the accuracy, efficiency, and confidence of the voter experience. This test fundamentally adopted the usability goals for a voting system as one that allows voters to cast their vote:

- Correctly – to use the voting system to register their intended selections with minimal errors and easily detect and correct errors when they occur.
- Efficiently – to complete the voting process in a timely manner and without unproductive, unwanted, incomprehensible, or frustrating interactions with the system.
- Confidently – to be confident (1) in what actions they had to perform in order to vote, (2) that their votes were correctly recorded by the system and will be correctly counted, and (3) that their privacy is assured.

This was an accessibility test testing accessible voting systems with specific populations of people with disabilities; able bodied individuals participated as well.

Conformance test goals are to detect aspects of the system that do not meet a standard, not to identify the cause of failure. A usability test for conformance to a usability standard is a specialized type of summative test. For voting systems, such a test requires usability performance benchmarks as part of the standard to test against. These benchmarks include a representative set of test ballots and a well-specified test protocol that is explicit about how many and what types of voter populations to test against. Further, the conformance test has to be validated to produce repeatable results.

Therefore this summative test took the first steps towards meeting the proposed benchmarks for Voting System Standards Usability Testing. Because there is not an adopted benchmark to date, this test was administered in line with the intent of the proposed benchmarks. The results and findings of the test will not attempt to mirror those of the proposed benchmark.

Among the basic metrics for voting usability are:

- Low error rate for marking the ballot (the voter selection is correctly conveyed to and represented within the voting system)
- Efficient operation (time required to vote is not excessive)
- Satisfaction (voter experience is safe, comfortable, free of stress, and instills confidence)

Method

Participants

The test was conducted using fourteen individuals' both those representative of the general population of US voters as well as those with disabilities. All participants were required to have the following characteristics to participate:

a) Eligible to vote in the United States;

b) Speaks English fluently;

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c) Willing to sign a non disclosure agreement;

d) Willing to sign a Participant Consent form;

Participants were selected by using an accessibility recruiting screener to ensure the specific demographic characteristics of; education, race, gender, and visual or cognitive disability to best represent those individuals most likely to use the AutoMARK VAT. There is no reason to believe that there were any significant differences between the participant sample and the general voting population.

Table 8 Participant Profile

Participant #	Gender	Age	Education	Race	Geographic	Self Reported Disability
1	Female	65+	Post graduate	Caucasian	Urban	n/a
2	Female	65+	Some college	Caucasian	Urban	n/a
3	Female	45 - 54	College graduate	Caucasian	Urban	n/a
4	Female	65+	High school	Caucasian	Urban	n/a
5	Female	65+	Some college	Other	Urban	Blind, Dexterity
6	Male	65+	College graduate	Caucasian	Urban	Low vision, Cognitive
7	Male	65+	High school	Caucasian	Urban	other
8	Female	65+	College graduate	Caucasian	Urban	n/a
9	Female	65+	Some college	Caucasian	Urban	Dexterity
10	Male	65+	Post graduate	Caucasian	Urban	Other
11	Female	65+	Some college	Caucasian	Urban	n/a
12	Female	65+	Some college	Other	Transient	Other
13	Male	65+	Post graduate	Caucasian	Urban	Low vision
14	Female	65+	College graduate	Caucasian	Urban	Other

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Context of Product Use in the Test

Tasks

The test was comprised of two primary tasks; making vote selections using one of the AutoMARK interfaces and then using the AutoCast function to cast the paper ballot into a secure ballot box. These are the primary voting tasks that have a direct effect on the test objectives of allowing a voter to cast their vote correctly, efficiently and comfortably.

The test participants were instructed to make specific voting choices on the AutoMARK. All instructions about filling out the ballot were given to the participants either in writing or verbally for those who could not read the instructions, with no additional individual assistance offered. (See Appendix B)

Instructions for the participants included directions to represent realistic and commonly occurring ballot selections such as:

- Voting for names that appeared at various positions within a list of names
- Not voting in specific contests on the ballot
- Indicating a write-in vote

The participants were given verbal instructions on casting the ballot.

The key consideration for selecting the tasks was to balance of representative voter use of the product with the need to achieve future voting system benchmarks.

The source of the tasks was collaboration between product management and usability.

Test Facility

Intended context of use:
Precinct based voting can take place at any facility meeting the local jurisdictions requirements. Standard precinct based voting facilities vary widely from homeowner's garages, to public school auditoriums.

Context used for the test:
The usability test was conducted at community center that is typical of a standard voting precinct. There were 2 AutoMARK VAT system installed in a large activity center that resembled a realistic voting location. The participants' actions of inserting and marking the ballot, reviewing screen messages and casting the ballot were recorded using 2 cameras and Morae Usability testing software.

Participant's Computing Environment

The participants used the ES&S AutoMARK Voter Assist Terminal version 1.6.0.0

Display Devices:
The AutoMark uses a touch screen as the mechanism for participants to both view the messages presented and make selections such as accepting the option to reject or cast a ballot.

The display is a color liquid crystal display, with a portrait orientation. The LCD is a high-contrast device suitable for use in environments with bright ambient light. The LCD is backlit using CCFL (cold cathode fluorescent lamp) devices. Current design uses a display panel manufactured by

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either LG Philips or Sharp. The display is a 15-inch device (measured diagonally).

LCD specifications include the following:

Table 9 LIQUID CRYSTAL DISPLAY SPECIFICATIONS

ITEM	ATTRIBUTE	SPEC	UNITS
1.	LCD TECHNOLOGY	TFT	
2.	NOMINAL SIZE (DIAGONAL)	15	INCHES
3.	VIEWING AREA, WIDTH	8.9	INCHES
4.	VIEWING AREA, HEIGHT	11.9	INCHES
5.	EQUIVALENT PC SCREEN SPECIFICATION	XGA	
6.	SCREEN RESOLUTION, HORIZONTAL	768	PIXELS
7.	SCREEN RESOLUTION, VERTICAL	1024	PIXELS
8.	COLOR DEPTH	64K	COLORS
9.	DISPLAY BRIGHTNESS	≥250	NITS

The paper ballot was 8.5" x 11"in size.

Test Administrator Tools

Tasks were timed using Morae Recorder Usability Testing Software. Sessions were videotaped (one camera was used to capture the participants interaction with the screen and one camera was used to observe the facial actions of the participant), although information derived from the recordings are not part of this report. At the end of the sessions, participants completed a 2 part questionnaire. The first part of the questionnaire assessed confidence and the second part assessed usability with the standard System Usability Scale (SUS) using a 5-point Likert scale.

Experimental Design

The experimental design was a between subject study. No control variables (other than voter type) were accounted for either experimentally or statistically. Counterbalancing was not done because the two tasks needed to occur in chronological order.

Several additional control variables were recorded, including English proficiency, voting eligibility, gender, age, race, education, geographic background and disability.

There were 5 dependent variables: unassisted task completion rate, base accuracy score, time to task completion, voter confidence and System Usability Scale score.

Procedure

a. Upon arrival at the community center, the participants were met by a greeter and asked to first fill out the consent form and were offered a second form for their records.
b. They were given the same greeting; "Thank you for your interest to participate in our study. We appreciate your help. We are researching which things are easy to do and which are difficult to do on the AutoMARK. Please understand that we are not in any way testing your ability. We are evaluating the AutoMARK's Usability."
c. They were then given paper ballot (Appendix A), and a set of

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written instructions (Appendix B). They were told that the test facilitator will not be able to assist them once they had started. The exception is for those with visual impairments.

d. The participant was escorted to one of the two AutoMARK VAT's where they were "introduced" to a test facilitator.
e. The facilitator took the blank paper ballot and inserted it into the AutoMARK the same way a Poll worker would do in a real election.
f. The participant would then follow the instructions making the vote selections.
g. The test facilitator was able to verbally read the instructions aloud for those who could not read the instructions. They were read as many times as the participant requested.
h. When the participant finished making their selections, they were presented an option to mark their paper ballot.
i. The AutoMark would mark the paper ballot as the participant selected and the ballot summary review would be presented back to the voter for verification.
j. At that point the participant had the option to cast their ballot or have it returned so that they could obtain a new ballot and start over.
k. Once the participant indicated they were finished, they were verbally given the the12 question survey to provide us feedback on their voting experience.
l. Upon completion of the survey the participant was returned to the greeter where they were thanked and given an option of the available gifts.

Participant General Instructions

Once the test began, the following statement was read by the test facilitator in response to any question from a participant:
"I'm sorry but I'm not allowed to help you once you start. If you are having difficulties you can try to finish. If you are stuck and cannot continue, you can stop if you wish."

Participant Task Instructions

The test participants were told to make specific voting choices on the ballot. All instructions about filling out the ballot were given to the participants in writing, with no additional individual assistance offered. (See Appendix B) The test facilitator was able to verbally read the instructions aloud for those who could not read the instructions. They were read as many times as the participant requested.

The following statement was read by the test facilitator in response to any question from a participant:

"I'm sorry but I'm not allowed to help you once you start. If you are having difficulties you can try to finish. If you are stuck and cannot continue, you can stop if you wish."

Various tasks were included in the instructions for the participants to represent realistic voting events. These included:

• Voting for names that appeared at various positions within a list of names

• Not voting in specific contests on the ballot

• Indicating a write-in vote

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By instructing the participants how to vote, the difference between the "intended" votes of the test participants and the actual votes that they cast can be determined. Accuracy of the cast ballot is calculated by counting the number of correct votes, 11 being a perfect score. Note that both the test ballot and the tasks were constructed to be complex enough to expose the different types of errors that would occur if a voting system design had poor usability.

Usability Metrics

Effectiveness

Completion Rate: Unassisted task completion rate was defined as the percentage of participants who completed each task correctly without assistance from the test administrator.

Base Accuracy Score: is the mean of the percentage of all ballot choices that are correctly cast by each of the test participants.

Efficiency

Task time: is the amount of time to complete the task.

Satisfaction

Voter Confidence Score: the mean confidence level expressed by the voters that they believed they voted correctly and the system successfully recorded their votes. This was based on a confidence question developed specifically for this type of test.

System Usability Scale: is a simple, ten-item scale giving a global view of subjective assessments of usability.

Results

Data Analysis

Data Scoring: Participant behavior was categorized into groups of successes, accuracy, and satisfaction. Behaviors were marked as errors when a participant made an action that could not lead to them successfully casting their ballot.
Data Reduction: Data for each task was analyzed separately and summarized together. Data was based on a voter using an accessible voting device whether they were actually disabled or not.
Statistical Analyses: Descriptive statistics used included: means, minimum values, and maximum values. There were no inferential statistical analyses performed.

Presentation of the Results

Performance Results

The mean task completion time for all 14 participants was 9.36 minutes for making their selections on the AutoMARK VAT and casting their vote. The user group had a base

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acuracy98.05% and an unassisted task completion rate of 64%. There were 5 dependent variables; these were task completion rate, base accuracy score, time to task completion, voter confidence and number of errors.

Typical Voting Performance Results by Participant

Participant #	Unassisted Task Completion Rate	Base Accuracy Score	Casting Ballot Task Time
1	100%	11	10.64
2	100%	11	9.48
3	100%	11	7.56
4	100%	11	7.58
5	100%	11	10.73
6	100%	11	15.01
7	100%	11	4.46
8	100%	11	6.43
9	100%	11	13.53
10	100%	11	6.76
11	100%	11	13.02
12	100%	10	7.16
13	100%	10	9.35
14	0%	0	Abandon

Satisfaction Results

A questionnaire was administered to participants after they cast their ballot, which resulted in a mean score of 64.62 (out of 100) based on the standard method of the System Usability Scale (SUS) and a 4.6 (out of 5) confidence score.

Participant #	Voter Confidence	SUS
1	5	67.5
2	5	55
3	5	87.5
4	3	77.5
5	4	67.5
6	5	62.5
7	5	62.5
8	4	50
9	4	55
10	5	60
11	5	55
12	5	50
13	5	90
14	0	0

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Appendices

Appendix A – Test Paper Ballot

This provides a reduced size image of how the ballot was laid out.

Appendix B -- Instructions for Participants

These are the instructions that were given to each participant on how to mark their ballot.

Appendix C – Facilitator Notes

These are the instructions that were given to each facilitator to ensure consistent interaction with the participant.

Appendix D -- Voting System Usability Scale – Voting SUS

This document contains a list of questions and the 5 point Likert scale for the SUS assessment and the two questions used to establish confidence.

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Appendix A

Test Paper Ballot

GEN02 CERTIFICATION TEST CASE
ELECTION DISTRICT 1

GOVERNOR AND LIEUTENANT GOVERNOR
(VOTE FOR ONE)

GOVERNOR THOMAS DEVINE
LT. GOVERNOR SHARON BECK
ORANGE

GOVERNOR NANCY BROWN
LT. GOVERNOR EDWARD ROCK
YELLOW

GOVERNOR WILLIAM GILBERT
LT. GOVERNOR JOE SULLIVAN
COMPOSER

GOVERNOR JEFF J. MARSHALL
LT. GOVERNOR M.K. WATSON
SCIENTIST

SECRETARY OF STATE
(VOTE FOR ONE)

TONI MORRISON
YELLOW

FRANK SAMSON
COMPOSER

GEORGE TARKETT
SCIENTIST

ATTORNEY GENERAL
(VOTE FOR ONE)

D. GRANITE
YELLOW

Write-In

COUNTY COMMISSIONER
(VOTE FOR TWO)

DAISY GANNON
NONPARTISAN

NICK CARRAWAY
NONPARTISAN

SCOTT FITZGERALD
NONPARTISAN

JAY GATSBY
NONPARTISAN

COUNTY TREASURER
(VOTE FOR ONE)

ROSS PEROT
COMPOSER

DONALD TRUMP
SCIENTIST

Write-In

SHERIFF
(VOTE FOR ONE)

ERIC CLAPTON
NONPARTISAN

BOB MARLEY
NONPARTISAN

Write-In

CITY COUNCIL
(VOTE FOR THREE)

JANE DOE
ORANGE

ANDREW WISE
ORANGE

ERICK COPELAND
COMPOSER

ANDREW WISE
COMPOSER

THOMAS EDISON
SCIENTIST

JOHN FOXWORTH
SCIENTIST

ROBERT SHAW
SCIENTIST

Write-In

Write-In

Write-In

SUPERINTENDENT
(VOTE FOR ONE)

B. BAKER
YELLOW

Write-In

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Appendix B

Instructions for Participants

In our mock election, we will be using fake names for candidates and for political parties.

Parties will be represented by either colors or occupations.

For example, you might see or hear this:

Joe Jones / Yellow Party

-or-

Mary Smith / Scientist

Any similarity between names of candidates and real people is purely coincidental.

Please attempt to vote exactly as described on the back of this page

Once you start, we will not be able to help you.

Please do the best you can. If you are stuck and cannot continue, inform the facilitator.

Thank you.

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For Governor and Lieutenant Governor, vote for

William Gilbert & Joe Sullivan

For Secretary of State, vote for
Frank Samson

For Attorney General,
Do not vote

For County Commissioner, vote for the following candidates:
Daisy Gannon
Scott Fitzgerald

For County Treasurer, vote for
Ross Perot

For Sheriff,
Do not vote

For City Council, vote for the following candidates:
Jane Doe
Erick Copeland
Robert Shaw

For Superintendent, write in a vote for
Bob Adams

Cast your ballot

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Appendix C

Facilitation Notes

Facilitator and Participant interaction

To minimize interference in the measurement of usability, once the participant has begun the test, the facilitator's interaction with them is limited to the following statement:

"I'm sorry but I'm not allowed to help you once you start. If you are having difficulties you can try to finish. If you are stuck and cannot continue, you can stop if you wish."

The only facilitator interaction allowed will be to provide the visually impaired participants the instructions on which contest selections are to be marked.

They must be read exactly as the written instructions.

They can be read to the participant as many times as requested.

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Appendix D

Voting System Usability Scale

1. To the best of my ability, I followed the instructions telling me how to vote.

☐ Yes ☐ No

2. I was able to cast all of the votes in today's test exactly as instructed

Strongly disagree				Strongly agree
1	2	3	4	5

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Error! Objects cannot be created from editing field codes.

	1	2	3	4	5
3. I think that I would like to vote on this system in a real election					
4. I found the voting system unnecessarily complex					
5. I thought the voting system was easy to use					
6. I think that I would need the support of a poll worker to be able to use this system					
7. I found the various functions in this voting system were well integrated					
8. I thought there was too much Inconsistency in this voting system					
9. I would imagine that most people would learn to use this voting system very quickly					
10. I found the system very cumbersome to use					
11. I felt very confident using the system					
12. I needed to learn a lot of things before I could get going with this system					

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Instructions to the participant:

I am going to ask you to rate some things on a 1 to 5 scale. You can choose one, or five, or any number in between. If you feel that you cannot respond to a question please choose the center point of the scale.

Please record your immediate response to each item, rather than thinking about items for a long time.

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EXPERIENCE RELIABILITY SECURITY INNOVATION
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

ISO/IEC 25062 Common Industry Format for Usability Test Report

DS200 Precinct Ballot Scanner
Version1.2.1

Tested by:

Christopher Fletcher C.U.A.
April, 2009

Date Prepared: April 30, 2009

Prepared by: Christopher Fletcher

Address inquiries to:

Steve M. Pearson
Phone: 402-593-0101
Email: smpearson@essvote.com
Address: 11208 John Galt Boulevard, Omaha, NE. 68137

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Document Section	Description
Entire Document	CIF Usability Test Results and Methodology

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Executive Summary

A summative usability test was conducted to evaluate the effectiveness, efficiency, and satisfaction of registered voters when they filled out a paper ballot and cast that ballot into the DS200 precinct-based, paper ballot tabulator.

The DS200 v1.2.1 paper ballot tabulator designed for polling place use. After a voter marks and inserts a ballot into the DS200, digital sensors simultaneously read both sides of the ballot, accurately record voter selections, and the counter passes the ballot to the integrated ballot box.

Twenty participants representative of the general voting population participated in the study. Each participant performed standard voting tasks using a paper ballot. First, the participant filled out a paper ballot with a pen, and then they cast their ballot using the DS200 precinct based tabulator.

The mean task completion time for all 20 participants was 26.38 seconds for submitting the paper ballot into the DS200 and casting their vote. The user group had a base accuracy score of 99.55% and an unassisted task completion rate of 100%. There were 5 dependent variables; these were unassisted task completion rate, base accuracy score, time to task completion, voter confidence and SUS score.

A questionnaire was also administered to participants after they cast their ballot, which resulted in a mean score of 86.125 based on the standard method of the System Usability Scale (SUS) and a 4.7 confidence score.

The test focused on evaluating the total number of correct votes and the number of ballots cast without any errors. The tasks were designed for the correct recording of the ballot selections while ensuring both independence and privacy.

- Table 1 -Summary Performance Results by User Type

User Type	Number of Participants Completing the Ballot	Base Accuracy Score (%)	Voting Time Mean	Voter Confidence Score Mean	Summative Usability Score Mean
General Population	**20 of 20 (100%)**	**99.55%**	**26.38 seconds**	**4.70**	**86.125**

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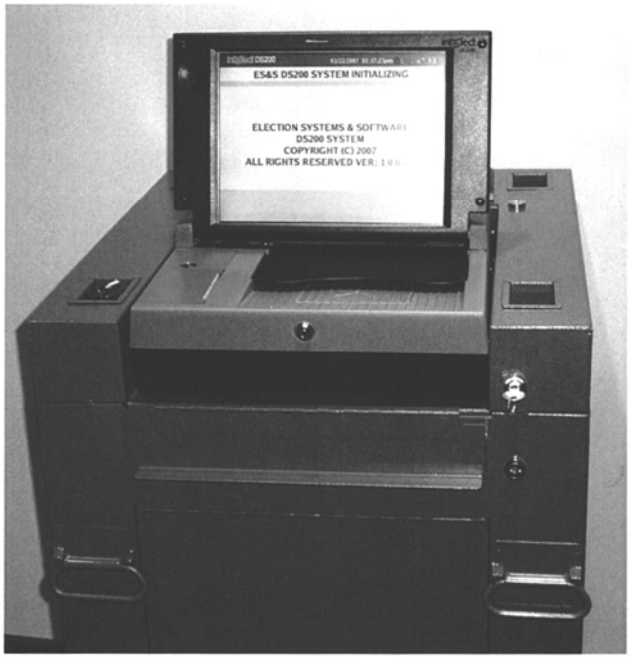
Introduction

Full Product Description

DS200 Precinct Ballot Scanner Firmware version 2.1.0.0, Hardware version 1.2.1

The DS200 is a paper ballot tabulator designed for the general voting population, intended to be used in a standard polling place. After a voter marks and inserts a ballot into the DS200, the system simultaneously scans both sides of the ballot using a high-resolution image-scanner. The system then decodes ballot images using a proprietary recognition engine.



A 12.1-inch touch screen display provides clear voter feedback and poll worker messaging. Once the system tabulates a ballot and updates internal vote counters, the ballot is transferred to a secure ballot box. An integrated thermal printer generates zero reports, log reports, and polling place totals after the polls officially close.

The DS200 accepts ballots inserted in any orientation – top first, face up; bottom first, face down; etc. Digital sensors simultaneously read both sides of the ballot, and accurately record voter selections, as the Counter passes the ballot to the integrated ballot box. The system either accepts the ballot, updating the internal count, or identifies and alerts the voter to exception conditions such as undervotes, overvotes, write-in votes or ballot mismarks with large, easy to read system messages and an audible alert. The DS200 provides clear instructions for resolving exception conditions, improving voter oversight and accountability and dramatically reducing the number of invalid ballots cast during an election.

Technical Overview – Physical Characteristics

DS200 unit dimensions	5.5" H (stowed) x 14" W x 16" D 19.5 pounds with internal battery
Storage & transport case dimensions	10.5" H x 16.5" W x 22" D 11.5 pounds
Ballot box dimensions (operational)	35"H x 20.75" W x 25.25" D 45 pounds

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Test Objectives

The goal of this summative usability test for voting systems is to identify and measure failures, not to diagnose their cause. The focus is on the accuracy, efficiency, and confidence of the voter experience. This test fundamentally adopted the usability goals for a voting system as one that allows voters to cast their vote:

- Correctly – to use the voting system to register their intended selections with minimal errors and easily detect and correct errors when they occur.
- Efficiently – to complete the voting process in a timely manner and without unproductive, unwanted, incomprehensible, or frustrating interactions with the system.
- Confidently – to be confident (1) in what actions they had to perform in order to vote, (2) that their votes were correctly recorded by the system and will be correctly counted, and (3) that their privacy is assured.

Conformance test goals are to detect aspects of the system that do not meet a standard, not to identify the cause of failure. A usability test for conformance to a usability standard is a specialized type of summative test. For voting systems, such a test requires usability performance benchmarks as part of the standard to test against. These benchmarks include a representative set of test ballots and a well-specified test protocol that is explicit about how many and what types of voter populations to test against. Further, the conformance test has to be validated to produce repeatable results.

Therefore this summative test took the first steps towards meeting the proposed benchmarks for Voting System Standards Usability Testing. Because there is not an adopted benchmark to date, this test was administered in line with the intent of the proposed benchmarks. The results and findings of the test will not attempt to mirror those of the proposed benchmark.

Among the basic metrics for voting usability are:

- Low error rate for marking the ballot (the voter selection is correctly conveyed to and represented within the voting system)
- Efficient operation (time required to vote is not excessive)
- Satisfaction (voter experience is safe, comfortable, free of stress, and instills confidence)

Method

Participants

The test was conducted using twenty individuals' representative of the general population of US voters. All participants were required to have the following characteristics to participate:

a) Eligible to vote in the United States;

b) Speaks English fluently;

c) Willing to sign a non disclosure agreement;

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d) Willing to sign a Participant Consent form;

Participants were selected by using a recruiting screener (Participant Screener for Voting System Testing) to ensure the specific demographic characteristics of age, education, race, gender, and voting experience were representative of the general U.S. voting population. There is no reason to believe that there were any significant differences between the participant sample and the general voting population.

Table 2 Participant Profile

Participant #	Years Voting	Age	Education	Race	Gender	Geographic Background
1	Many	35-44	High School Degree	Caucasian	Female	Rural
2	Many	35-44	Some College	African-Am	Female	Urban
3	Few	25-34	College Grad	Hispanic	Male	Urban
4	Many	45-54	College Grad	Caucasian	Male	Urban
5	Few	45-54	Some College	Caucasian	Female	Rural
6	Many	45-54	Some College	African-Am	Male	Urban
7	Many	35-44	High School Degree	Caucasian	Female	Urban
8	Few	35-44	Some College	Caucasian	Female	Urban
9	Few	25-34	Post Graduate Degree	Caucasian	Male	Urban
10	Many	25-34	College Grad	Caucasian	Male	Urban
11	Many	35-44	College Grad	Caucasian	Female	Urban
12	Many	45-54	College Grad	Caucasian	Female	Urban
13	Many	25-34	College Grad	Caucasian	Female	Urban
14	Few	35-44	College Grad	Hispanic	Female	Urban
15	Many	35-44	Some College	African-Am	Male	Rural
16	Few	35-44	Some College	African-Am	Female	Urban
17	Many	45-54	College Grad	Caucasian	Male	Urban
18	Many	25-34	College Grad	Caucasian	Male	Urban
19	Few	25-34	High School Degree	Caucasian	Female	Urban
20	Few	25-34	College Grad	Caucasian	Female	Urban

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Context of Product Use in the Test

Tasks

The test was comprised of two primary tasks; filling out a paper ballot and casting the paper ballot in the DS200 tabulator. These are the primary voting tasks that have a direct effect on the test objectives of allowing a voter to cast their vote correctly, efficiently and comfortably.

The test participants were instructed to make specific voting choices on the paper ballot. All instructions about filling out the ballot were given to the participants in writing, with no additional individual assistance offered. (See Appendix B)

Instructions for the participants included directions to represent realistic and commonly occurring ballot selections such as:

- Voting for names that appeared at various positions within a list of names
- Not voting in specific contests on the ballot
- Indicating a write-in vote

The participants were given verbal instructions on casting the ballot.

The key consideration for selecting the tasks was to balance of representative voter use of the product with the need to achieve future voting system benchmarks.

The source of the tasks was collaboration between product management and usability.

Test Facility

Intended context of use:
Precinct based voting can take place at any facility meeting the local jurisdictions requirements. Standard precinct based voting facilities vary widely from homeowner's garages, to public school auditoriums.

Context used for the test:
The usability test was conducted at the ES&S headquarters in 2 standard conference rooms. The voting system was installed in a room that resembled a realistic voting location. Participants filled out their ballots in one room that contained a table and chairs and then proceeded to a second room that contained the DS200 where they cast the paper ballot. The participants' actions of inserting the ballot, reviewing screen messages and casting the ballot were recorded using 3 cameras and Morae Usability testing software.

Participant's Computing Environment

The DS200 Precinct Ballot Scanner uses the hardware version1.2.1 and firmware version 2.1.0.0.

Display Devices:
The DS200 uses a touch screen as the mechanism for participants to both view the messages presented and make selections such as accepting the option to reject or cast a ballot.

The LCD display is an LG Phillips 12.1" SVGA (800x600) TFT color display model LB121S03-TL01 with a LVDS interface to the VIA motherboard. It has a color depth of LVDS 6-bit, 262,144 colors with an anti-glare surface treatment.

The paper ballot was 8.5" x 11"in size.

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Test Administrator Tools

Tasks were timed using Morae Recorder Usability Testing Software. Sessions were videotaped (one camera was used to capture the participants interaction with the screen and two different views of the participant were captured with webcams); although information derived from the recordings are not part of this report. At the end of the sessions, participants completed a 2 part questionnaire. The first part of the questionnaire assessed confidence and the second part assessed usability with the standard System Usability Scale (SUS) using a 5-point Likert scale.

Experimental Design

The experimental design was a between subject study. No control variables (other than voter type) were accounted for either experimentally or statistically. Counterbalancing was not done because the two tasks needed to occur in chronological order.

Several additional control variables were recorded, to ensure participants were representative of the general voting population including voting experience, English proficiency, voting eligibility, gender, age, race, education and geographic background.

There were 5 dependent variables: unassisted task completion rate, base accuracy score, time to task completion, voter confidence and System Usability Scale score.

Procedure

- Upon arrival at the test lab, the participants, were asked to first fill out the consent form and were offered a second form for their records.
- They were given the same greeting; "Thank you for your interest to participate in our study. We appreciate your help. We are researching which things are easy to do and which are difficult to do on the DS200 Precinct Based Vote Tabulator. Please understand that we are not in any way testing your ability. We are evaluating the DS200's Usability."
- They were then given paper ballot (Appendix A), a black pen, and a set of written instructions (Appendix B). They were told that the test facilitator will not be able to assist them once they had started.
- When the participant finished filling out the paper ballot in the first room, they were instructed to take their paper ballot to the next room where they would cast their ballot. The instructions provided verbally in the second room were: "Welcome. Please close the door behind you. I will need to give you a set of instructions before we can get started".
- The voting instructions given by the test facilitator were "Please cast your ballot as if this were a real election and when you think you are finished please say I'm finished.
- Once the participant indicated they were finished, they were verbally instructed to: "Please return to the first room to complete a quick survey of 12 questions to provide us feedback on their voting experience."
- Once the participant was finished with the survey they were thanked and dismissed.

Participant General Instructions

Once the test began, the following statement was read by the test facilitator in response to any question from a participant:

"I'm sorry but I'm not allowed to help you once you start. If you are having

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difficulties you can try to finish. If you are stuck and cannot continue, you can stop if you wish."

Participant Task Instructions

The test participants were told to make specific voting choices on the paper ballot. All instructions about filling out the ballot were given to the participants in writing, with no additional individual assistance offered. (See Appendix B)

The following statement was read by the test facilitator in response to any question from a participant:

"I'm sorry but I'm not allowed to help you once you start. If you are having difficulties you can try to finish. If you are stuck and cannot continue, you can stop if you wish."

Various tasks were included in the instructions for the participants to represent realistic voting events. These included:

- Voting for names that appeared at various positions within a list of names
- Not voting in specific contests on the ballot
- Indicating a write-in vote

By instructing the participants how to vote, the difference between the "intended" votes of the test participants and the actual votes that they cast can be determined. Accuracy of the cast ballot is calculated by counting the number of correct votes, 11 being a perfect score. Note that both the test ballot and the tasks were constructed to be complex enough to expose the different types of errors that would occur if a voting system design had poor usability.

Once the participant finished filling out the paper ballot in the first room, they were instructed to take their paper ballot to the next room where they would cast their ballot. The instructions provided verbally in the second room were:

"Please cast your ballot as if this were a real election and when you think you are finished please say I'm finished.

Once the participant indicated they were finished, they were verbally instructed to:

"Please return to the other room to complete a quick survey of your voting experience."

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Usability Metrics

Effectiveness

Completion Rate: Unassisted task completion rate was defined as the percentage of participants who completed each task correctly without assistance from the test administrator.

Base Accuracy Score: is the mean of the percentage of all ballot choices that are correctly cast by each of the test participants.

Efficiency

Task time: is the amount of time to complete the task.

Satisfaction

Voter Confidence Score: the mean confidence level expressed by the voters that they believed they voted correctly and the system successfully recorded their votes. This was based on a confidence question developed specifically for this type of test.

System Usability Scale: is a simple, ten-item scale giving a global view of subjective assessments of usability.

Results

Data Analysis

Data Scoring: Participant behavior was categorized into groups of successes, accuracy, and satisfaction. Behaviors were marked as errors when a participant made an action that could not lead to them successfully casting their ballot.

Data Reduction: Data for each task was analyzed separately and summarized together. Data were also separated into 2 groups based on user type.

Statistical Analyses: Descriptive statistics used included: means, minimum values, and maximum values. There were no inferential statistical analyses performed.

Presentation of the Results

Performance Results

The mean task completion time for all 20 participants was 26.38 seconds for submitting the paper ballot into the DS200 and casting their vote. The user group had a base accuracy score of 99.55% and an unassisted task completion rate of 100%. There were 5 dependent variables; these were unassisted task completion rate, base accuracy score, time to task completion, voter confidence and SUS score.

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Participant #	Unassisted Task Completion Rate	Base Accuracy Score	Casting Ballot Task Time
1	100%	11	24.8
2	100%	11	44.29
3	100%	11	40.4
4	100%	11	24.02
5	100%	11	18.69
6	100%	11	23.59
7	100%	11	20.3
8	100%	11	32.2
9	100%	11	27.38
10	100%	11	29.82
11	100%	11	23.51
12	100%	11	22.9
13	100%	11	22.42
14	100%	11	17.9
15	100%	11	18.5
16	100%	11	25.41
17	100%	10	23.8
18	100%	11	36.78
19	100%	11	31.41
20	100%	11	19.5

Satisfaction Results

A questionnaire was administered to participants after they cast their ballot, which resulted in a mean score of 86.125 (out of a 100) based on the standard method of the System Usability Scale (SUS) and a 4.7 (out of 5) confidence score.

Participant #	Voter Confidence	SUS
1	5	90
2	5	97.5
3	5	95
4	3	55
5	4	67.5
6	5	85
7	5	87.5
8	4	80
9	4	77.5
10	5	77.5
11	5	90
12	5	87.5
13	5	97.5
14	5	97.5
15	5	85
16	5	90
17	5	97.5
18	5	97.5

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19	3	80
20	5	87.5

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Appendices

Appendix A – Test Paper Ballot

This provides a reduced size image of how the ballot was laid out.

Appendix B -- Instructions for Participants

These are the instructions that were given to each participant on how to mark their ballot.

Appendix C -- Facilitator Notes

These are the instructions that were given to each facilitator to ensure consistent interaction with the participant.

Appendix D -- Voting System Usability Scale – Voting SUS

This document contains a list of questions and the 5 point Likert scale for the SUS assessment and the two questions used to establish confidence.

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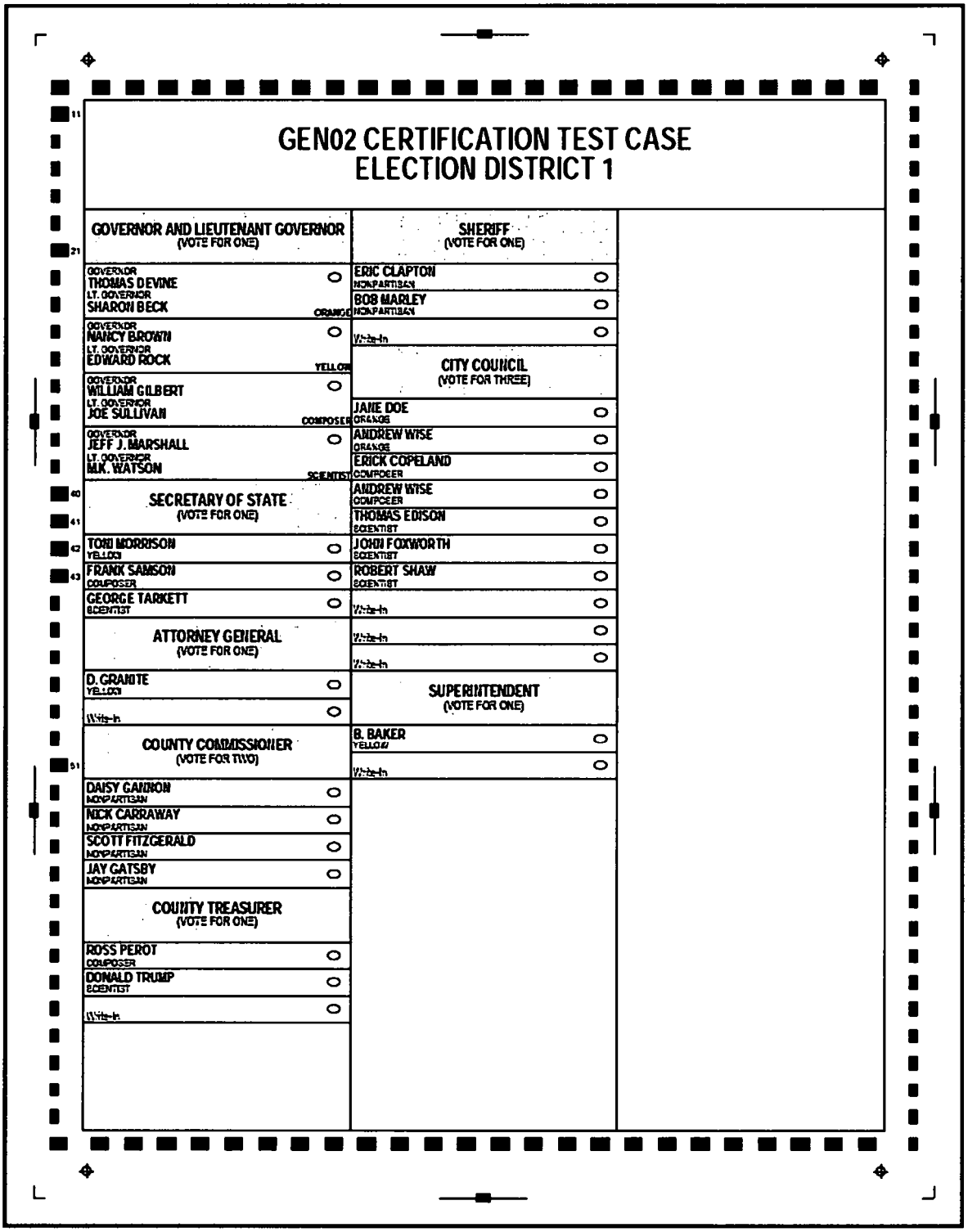
Appendix A

Test Paper Ballot



GEN02 CERTIFICATION TEST CASE
ELECTION DISTRICT 1

GOVERNOR AND LIEUTENANT GOVERNOR (VOTE FOR ONE)

- GOVERNOR THOMAS DEVINE / LT. GOVERNOR SHARON BECK — ORANGE
- GOVERNOR NANCY BROWN / LT. GOVERNOR EDWARD ROCK — YELLOW
- GOVERNOR WILLIAM GILBERT / LT. GOVERNOR JOE SULLIVAN — COMPOSER
- GOVERNOR JEFF J. MARSHALL / LT. GOVERNOR M.K. WATSON — SCIENTIST

SECRETARY OF STATE (VOTE FOR ONE)

- TONI MORRISON — YELLOW
- FRANK SAMSON — COMPOSER
- GEORGE TARKETT — SCIENTIST

ATTORNEY GENERAL (VOTE FOR ONE)

- D. GRANTE — YELLOW
- Write-In

COUNTY COMMISSIONER (VOTE FOR TWO)

- DAISY GANNON — NONPARTISAN
- NICK CARRAWAY — NONPARTISAN
- SCOTT FITZGERALD — NONPARTISAN
- JAY GATSBY — NONPARTISAN

COUNTY TREASURER (VOTE FOR ONE)

- ROSS PEROT — COMPOSER
- DONALD TRUMP — SCIENTIST
- Write-In

SHERIFF (VOTE FOR ONE)

- ERIC CLAPTON — NONPARTISAN
- BOB MARLEY — NONPARTISAN
- Write-In

CITY COUNCIL (VOTE FOR THREE)

- JANE DOE — ORANGE
- ANDREW WISE — ORANGE
- ERICK COPELAND — COMPOSER
- ANDREW WISE — COMPOSER
- THOMAS EDISON — SCIENTIST
- JOHN FOXWORTH — SCIENTIST
- ROBERT SHAW — SCIENTIST
- Write-In
- Write-In
- Write-In

SUPERINTENDENT (VOTE FOR ONE)

- B. BAKER — YELLOW
- Write-In

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Appendix B

Instructions for Participants

In our mock election, we will be using fake names for candidates and for political parties.

Parties will be represented by either colors or occupations.

For example, you might see or hear this:

Joe Jones / Yellow Party

-or-

Mary Smith / Scientist

Any similarity between names of candidates and real people is purely coincidental.

Please attempt to vote exactly as described on the back of this page

Once you start, we will not be able to help you.

Please do the best you can. If you are stuck and cannot continue, inform the facilitator.

Thank you.

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For Governor and Lieutenant Governor, vote for

William Gilbert & Joe Sullivan

For Secretary of State, vote for
Frank Samson

For Attorney General,
Do not vote

For County Commissioner, vote for the following candidates:
Daisy Gannon
Scott Fitzgerald

For County Treasurer, vote for
Ross Perot

For Sheriff,
Do not vote

For City Council, vote for the following candidates:
Jane Doe
Erick Copeland
Robert Shaw

For Superintendent, write in a vote for
Bob Adams

Cast your ballot

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Appendix C

Facilitation Notes

Facilitator and Participant interaction

To minimize interference in the measurement of usability, once the participant has begun the test, the facilitator's interaction with them is limited to the following statement:

"I'm sorry but I'm not allowed to help you once you start. If you are having difficulties you can try to finish. If you are stuck and cannot continue, you can stop if you wish."

The only facilitator interaction allowed will be to provide the blind participants the instructions on which contest selections are to be marked. They must be read exactly as the written instructions. They can be read to the participant as many times as requested.

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Appendix D

Voting System Usability Scale

1. To the best of my ability, I followed the instructions telling me how to vote.

☐ Yes ☐ No

	Strongly disagree				Strongly agree
2. I was able to cast all of the votes in today's test exactly as instructed	☐	☐	☐	☐	☐
	1	2	3	4	5

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3. I think that I would like to vote on this system in a real election

Error! Objects cannot be created from editing field

1	2	3	4	5

4. I found the voting system unnecessarily complex

1	2	3	4	5

5. I thought the voting system was easy to use

1	2	3	4	5

6. I think that I would need the support of a poll worker to be able to use this system

1	2	3	4	5

7. I found the various functions in this voting system were well integrated

1	2	3	4	5

8. I thought there was too much Inconsistency in this voting system

1	2	3	4	5

9. I would imagine that most people would learn to use this voting system very quickly

1	2	3	4	5

10. I found the system very cumbersome to use

1	2	3	4	5

11. I felt very confident using the system

1	2	3	4	5

12. I needed to learn a lot of things before I could get going with this system

1	2	3	4	5

codes.

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Instructions to the participant:

I am going to ask you to rate some things on a 1 to 5 scale. You can choose one, or five, or any number in between. If you feel that you cannot respond to a question please choose the center point of the scale.

Please record your immediate response to each item, rather than thinking about items for a long time.

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Conformity Statement: 2005 VVSG

Manufacturer: **Election Systems & Software LLC** *Product*: **ES&S Voting System 5.0.0.0** *Date*: **8/15/2012**

Stated Conformity

In the conform column please enter a "yes" if you system conforms to the standard. Enter "n/a" if the standard does not apply to you system

Requirement	***Requirement Text***	***Conform***
2	Functional Requirements	***Yes***
2.1	Overall System Capabilities	***Yes***
2.1.1	Security System security is achieved through a combination of technical capabilities and sound administrative practices. To ensure security, all systems shall:	***Yes***
2.1.1.a.	Provide security access controls that limit or detect access to critical system components to guard against loss of system integrity, availability, confidentiality, and accountability	***Yes***
2.1.1.b	Provide system functions that are executable only in the intended manner and order, and only under the intended conditions	***Yes***
2.1.1.c	Use the system's control logic to prevent a system function from executing if any preconditions to the function have not been met	***Yes***
2.1.1.d	Provide safeguards in response to system failure to protect against tampering during system repair or interventions in system operations	***Yes***
2.1.1.e	Provide security provisions that are compatible with the procedures and administrative tasks involved in equipment preparation, testing, and operation	***Yes***
2.1.1.f	Incorporate a means of implementing a capability if access to a system function is to be restricted or controlled	***Yes***
2.1.1.g	Provide documentation of mandatory administrative procedures for effective system security	***Yes***
2.1.2	Accuracy Memory hardware, such as semiconductor devices and magnetic storage media, must be accurate. The design of equipment in all voting systems shall provide for the highest possible levels of protection against mechanical, thermal, and electromagnetic stresses that impact system accuracy. Section 4 provides additional information on susceptibility requirements. To ensure vote accuracy, all systems shall:	***Yes***
2.1.2.a	Record the election contests, candidates, and issues exactly as defined by election officials	***Yes***
2.1.2.b	Record the appropriate options for casting and recording votes	***Yes***
2.1.2.c	Record each vote precisely as indicated by the voter and produce an accurate report of all votes cast;	***Yes***
2.1.2.d	Include control logic and data processing methods incorporating parity and check-sums (or equivalent error detection and correction methods) to demonstrate that the system has been designed for accuracy	***Yes***
2.1.2.e	Provide software that monitors the overall quality of data read-write and transfer quality status, checking the number and types of errors that occur in any of the relevant operations on data and how they were corrected	***Yes***
2.1.2.f	In addition, DRE systems shall: As an additional means of ensuring accuracy in DRE systems, voting devices shall record and retain redundant copies of the original ballot image. A ballot image is an electronic record of all votes cast by the voter, including undervotes.	***N/A***
2.1.3	Error Recovery To recover from a non-catastrophic failure of a device, or from any error or malfunction that is within the operator's ability to correct, the system shall provide the following capabilities:	***Yes***

Manufacturer: **Election Systems & Software LLC**

Requirement	***Requirement Text***	***Conform***
2.1.3.a	Restoration of the device to the operating condition existing immediately prior to the error or failure, without loss or corruption of voting data previously stored in the device.	***Yes***
2.1.3.b	Resumption of normal operation following the correction of a failure in a memory component, or in a data processing component, including the central processing unit	***Yes***
2.1.3.c	Recovery from any other external condition that causes equipment to become inoperable, provided that catastrophic electrical or mechanical damage due to external phenomena has not occurred	***Yes***
2.1.4	Integrity measures ensure the physical stability and function of the vote recording and counting processes. To ensure system integrity, all systems shall:	***Yes***
2.1.4.a	Protect against a single point of failure that would prevent further voting at the polling place	***Yes***
2.1.4.b	Protect against the interruption of electrical power	***Yes***
2.1.4.c	Protect against generated or induced electromagnetic radiation	***Yes***
2.1.4.d.	Protect against ambient temperature and humidity fluctuations	***Yes***
2.1.4.e	Protect against the failure of any data input or storage device	***Yes***
2.1.4.f	Protect against any attempt at improper data entry or retrieval	***Yes***
2.1.4.g	Record and report the date and time of normal and abnormal events	***Yes***
2.1.4.h	Maintain a permanent record of all original audit data that cannot be modified or overridden but may be augmented by designated authorized officials in order to adjust for errors or omissions (e.g., during the canvassing process)	***Yes***
2.1.4.i	Detect and record every event, including the occurrence of an error condition that the system cannot overcome, and time-dependent or programmed events that occur without the intervention of the voter or a polling place operator	***Yes***
2.1.4.j	Include built-in measurement, self-test, and diagnostic software and hardware for detecting and reporting the system's status and degree of operability	***Yes***
2.1.4.k	In addition to the common requirements, DRE systems shall: Maintain a record of each ballot cast using a process and storage location that differs from the main vote detection, interpretation, processing, and reporting path	***N/A***
2.1.4.l	In addition to the common requirements, DRE systems shall: Provide a capability to retrieve ballot images in a form readable by humans	***N/A***
2.1.5	System Audit	***Yes***

Requirement	***Requirement Text***	***Conform***
2.1.5	This subsection describes the context and purpose of voting system audits and sets forth specific functional requirements. Election audit trails provide the supporting documentation for verifying the accuracy of reported election results. They present a concrete, indestructible archival record of all system activity related to the vote tally, and are essential for public confidence in the accuracy of the tally, for recounts, and for evidence in the event of criminal or civil litigation. These requirements are based on the premise that system-generated creation and maintenance of audit records reduces the chance of error associated with manually generated audit records. Because most audit capability is automatic, the system operator has less information to track and record, and is less likely to make mistakes or omissions. The subsections that follow present operational requirements critical to acceptable performance and reconstruction of an election. Requirements for the content of audit records are described in Section 5. The requirements for all system types, both precinct and central count, are described in generic language. Because the actual implementation of specific characteristics may vary from system to system, it is the responsibility of the vendor to describe each system's characteristics in sufficient detail so that test labs and system users can evaluate the adequacy of the system's audit trail. This description shall be incorporated in the System Operating Manual, which is part of the Technical Data Package. Documentation of items such as paper ballots delivered, paper ballots collected, administrative procedures for system security, and maintenance performed on voting equipment are also part of the election audit trail, but are not covered in these technical standards. Useful guidance is provided by the Innovations in Election Administration #10; Ballot Security and Accountability, available on the EAC's website.	***Yes***
2.1.5.1	Operational Requirements	***Yes***
2.1.5.1	Audit records shall be prepared for all phases of election operations performed using devices controlled by the jurisdiction or its contractors. These records rely upon automated audit data acquisition and machine-generated reports, with manual input of some information. These records shall address the ballot preparation and election definition phase, system readiness tests, and voting and ballot-counting operations. The software shall activate the logging and reporting of audit data as described below.	***Yes***
2.1.5.1.a	Time and Sequence of Audit Records The timing and sequence of audit record entries is as important as the data contained in the record. All voting systems shall meet the requirements for time, sequence and preservation of audit records outlined below.	***Yes***
2.1.5.1.a.i	Except where noted, systems shall provide the capability to create and maintain a real-time audit record. This capability records and provides the operator or precinct official with continuous updates on machine status. This information allows effective operator identification of an error condition requiring intervention, and contributes to the reconstruction of election-related events necessary for recounts or litigation.	***Yes***
2.1.5.1.a.ii	All systems shall include a real-time clock as part of the system's hardware. The system shall maintain an absolute record of the time and date or a record relative to some event whose time and data are known and recorded.	***Yes***
2.1.5.1.a.iii.	All audit record entries shall include the time-and-date stamp.	***Yes***
2.1.5.1.a.iv.	The audit record shall be active whenever the system is in an operating mode. This record shall be available at all times, though it need not be continually visible.	***Yes***
2.1.5.1.a.v	The generation of audit record entries shall not be terminated or altered by program control, or by the intervention of any person. The physical security and integrity of the record shall be maintained at all times.	***Yes***
2.1.5.1.a.vi.	Once the system has been activated for any function, the system shall preserve the contents of the audit record during any interruption of power to the system until processing and data reporting have been completed.	***Yes***

Requirement	***Requirement Text***	***Conform***
2.1.5.1.a.vii.	The system shall be capable of printing a copy of the audit record. A separate printer is not required for the audit record, and the record may be produced on the standard system printer if all the following conditions are met: • The generation of audit trail records does not interfere with the production of output reports • The entries can be identified so as to facilitate their recognition, segregation, and retention • The audit record entries are kept physically secure	***Yes***
2.1.5.1.b	Error messages All voting systems shall meet the requirements for error messages below.	***Yes***
2.1.5.1.b.i.	The voting system shall generate, store, and report to the user all error messages as they occur.	***Yes***
2.1.5.1.b.ii	All error messages requiring intervention by an operator or precinct official shall be displayed or printed clearly in easily understood language text, or by means of other suitable visual indicators.	***Yes***
2.1.5.1.b.iii	When the voting system uses numerical error codes for trained technician maintenance or repair, the text corresponding to the code shall be self-contained, or affixed inside the voting machine. This is intended to reduce inappropriate reactions to error conditions, and to allow for ready and effective problem correction.	***Yes***
2.1.5.1.b.iv.	All error messages for which correction impacts vote recording or vote processing shall be written in a manner that is understandable to an election official who possesses training on system use and operation, but does not possess technical training on system servicing and repair.	***Yes***
2.1.5.1.b.v.	The message cue for all voting systems shall clearly state the action to be performed in the event that voter or operator response is required.	***Yes***
2.1.5.1.b.v.i.	Voting system design shall ensure that erroneous responses will not lead to irreversible error.	***Yes***
2.1.5.1.b.v.ii.	Nested error conditions shall be corrected in a controlled sequence such that voting system status shall be restored to the initial state existing before the first error occurred.	***Yes***
2.1.5.1.c.	Status Messages	***Yes***
2.1.5.1.c.	The Guidelines provide latitude in software design so that vendors can consider various user processing and reporting needs. The jurisdiction may require some status and information messages to be displayed and reported in real-time. Messages that do not require operator intervention may be stored in memory to be recovered after ballot processing has been completed. The voting system shall display and report critical status messages using clear indicators or English language text. The voting system need not display non-critical status messages at the time of occurrence. Voting systems may display non-critical status messages (i.e., those that do not require operator intervention) by means of numerical codes for subsequent interpretation and reporting as unambiguous text. Voting systems shall provide a capability for the status messages to become part of the real-time audit record. The voting system shall provide a capability for a jurisdiction to designate critical status messages.	***Yes***
2.1.5.2	Use of Shared Computing Platforms (COTS operating system (off-the-shelf))	***Yes***

Requirement	***Requirement Text***	***Conform***
2.1.5.2	Further requirements must be applied to Commercial-off-the-Shelf operating systems to ensure completeness and integrity of audit data for election software. These operating systems are capable of executing multiple application programs simultaneously. These systems include both servers and workstations, including the many varieties of UNIX and Linux, and those offered by Microsoft and Apple. Election software running on these systems is vulnerable to unintended effects from other user sessions, applications, and utilities executing on the same platform at the same time as the election software. "Simultaneous processes" of concern include: unauthorized network connections, unplanned user logins, and unintended execution or termination of operating system processes. An unauthorized network connection or unplanned user login can host unintended processes and user actions, such as the termination of operating system audit, the termination of election software processes, or the deletion of election software audit and logging data. The execution of an operating system process could be a full system scan at a time when that process would adversely affect the election software processes. Operating system processes improperly terminated could be system audit or malicious code detection. To counter these vulnerabilities, three operating system protections are required on all such systems on which election software is hosted. First, authentication shall be configured on the local terminal (display screen and keyboard) and on all external connection devices ("network cards" and "ports"). This ensures that only authorized and identified users affect the system while election software is running. Second, operating system audit shall be enabled for all session openings and closings, for all connection openings and closings, for all process executions and terminations, and for the alteration or deletion of any memory or file object. This ensures the accuracy and completeness of election data stored on the system. It also ensures the existence of an audit record of any person or process altering or deleting system data or election data. Third, the system shall be configured to execute only intended and necessary processes during the execution of election software. The system shall also be configured to halt election software processes upon the termination of any critical system process (such as system audit) during the execution of election software.	***Yes***
2.1.6	Election Management System The Election Management System (EMS) is used to prepare ballots and programs for use in casting and counting votes, and to consolidate, report, and display election results. An EMS shall generate and maintain a database, or one or more interactive databases, that enables election officials or their designees to perform the following functions: • Define political subdivision boundaries and multiple election districts as indicated in the system documentation • Identify contests, candidates, and issues • Define ballot formats and appropriate voting options • Generate ballots and election-specific programs for voting equipment • Install ballots and election-specific programs • Test that ballots and programs have been properly prepared and installed •Accumulate vote totals at multiple reporting levels as indicated in the system documentation •Generate the post-voting reports required by Subsection 2.4 •Process and produce audit reports of the data as indicated in Subsection 5.5	***Yes***
2.1.7	Vote Tabulating Program Each voting system shall have a vote tabulation program that will meet specific functional requirements.	***Yes***
2.1.7.1	Functions The vote tabulating program software resident in each voting machine, vote count server, or other devices shall include all software modules required to:	***Yes***

Requirement	***Requirement Text***	***Conform***
2.1.7.1.a.	Monitor system status and generate machine-level audit reports	***Yes***
2.1.7.1.b.	Accommodate device control functions performed by polling place officials and maintenance personnel	***Yes***
2.1.7.1.c.	Register and accumulate votes	***Yes***
2.1.7.1.d.	Accommodate variations in ballot counting logic	***Yes***
2.1.7.2	Voting Variation There are significant variations among state election laws with respect to permissible ballot contents, voting options, and the associated ballot counting logic. The Technical Data Package accompanying the system shall specifically identify which of the following items can and cannot be supported by the voting system, as well as how the voting system can implement the items supported:	***Yes (See Below)***
2.1.7.2	Closed primaries	***Yes***
2.1.7.2	Open primaries	***Yes***
2.1.7.2	Partisan offices	***Yes***
2.1.7.2	Non-partisan offices	***Yes***
2.1.7.2	Write-in voting	***Yes***
2.1.7.2	Primary presidential delegation nominations	***N/A***
2.1.7.2	Ballot rotation	***Yes***
2.1.7.2	Straight party voting	***Yes***
2.1.7.2	Cross-party endorsement	***Yes***
2.1.7.2	Split precincts	***Yes***
2.1.7.2	Vote for N of M	***Yes***
2.1.7.2	Recall issues, with options	***Yes***
2.1.7.2	Cumulative voting	***N/A***
2.1.7.2	Ranked order voting	***N/A***
2.1.7.2	Provisional or challenged ballots	***Yes***
2.1.8	Ballot Counter For all voting systems, each piece of voting equipment that tabulates ballots shall provide a counter that:	***N/A***
2.1.8.a.	Can be set to zero before any ballots are submitted for tally	***Yes***
2.1.8.b.	Records the number of ballots cast during a particular test cycle or election	***Yes***
2.1.8.c.	Increases the count only by the input of a ballot	***Yes***
2.1.8.d.	Prevents or disables the resetting of the counter by any person other than authorized persons at authorized points	***Yes***
2.1.8.e.	Is visible to designated election officials	***Yes***
2.1.9	Telecommunications	***N/A***
2.1.9	For all voting systems that use telecommunications for the transmission of data during pre-voting, voting or post-voting activities, capabilities shall be provided that ensure data are transmitted with no alteration or unauthorized disclosure during transmission. Such transmissions shall not violate the privacy, secrecy, and integrity demands of the Guidelines. Section 6 describes telecommunications standards that apply to, at a minimum, the following types of data transmissions: ♦Voter Authentication: Coded information that confirms the identity of a voter for security purposes for a system that transmit votes individually over a public network ♦Ballot Definition: Information that describes to voting equipment the content and appearance of the ballots to be used in an election ♦Vote Transmission to Central Site: For voting systems that transmit votes individually over a public network, the transmission of a single vote to the county (or contractor) for consolidation with other county vote data ♦Vote Count: Information representing the tabulation of votes at any one of several levels: polling place, precinct, or central count ♦List of Voters: A listing of the individual voters who have cast ballots in a specific election	***N/A***
2.1.10	Data Retention	***Yes***

Requirement	***Requirement Text***	***Conform***
2.1.10	United States Code Title 42, Sections 1974 through 1974e state that election administrators shall preserve for 22 months "all records and paper that came into (their) possession relating to an application, registration, payment of poll tax, or other act requisite to voting." This retention requirement applies to systems that will be used at anytime for voting of candidates for federal offices (e.g., Member of Congress, United States Senator, and/or Presidential Elector). Therefore, all voting systems shall provide for maintaining the integrity of voting and audit data during an election and for a period of at least 22 months thereafter. Because the purpose of this law is to assist the federal government in discharging its law enforcement responsibilities in connection with civil rights and elections crimes, its scope must be interpreted in keeping with that objective. The appropriate state or local authority must preserve all records that may be relevant to the detection and prosecution of federal civil rights or election crimes for the 22-month federal retention period, if the records were generated in connection with an election that was held in whole or in part to select federal candidates. It is important to note that Section 1974 does not require that election officials generate any specific type or classification of election record. However, if a record is generated, Section 1974 comes into force and the appropriate authority must retain the records for 22 months. For 22-month document retention, the general rule is that all printed copy records produced by the election database and ballot processing systems shall be so labeled and archived. Regardless of system type, all audit trail information spelled out in Subsection 5.5 shall be retained in its original format, whether that be real-time logs generated by the system, or manual logs maintained by election personnel. The election audit trail includes not only in-process logs of election-night and subsequent processing of absentee or provisional ballots, but also time logs of baseline ballot definition formats, and system readiness and testing results. In many voting systems, the source of election-specific data (and ballot formats) is a database or file. In precinct count voting systems, this data is used to program each machine, establish ballot layout, and generate tallying files. It is not necessary to retain this information on electronic media if there is an official, authenticated printed copy of all final database information. However, it is recommended that the state or local jurisdiction also retain electronic records of the aggregate data for each voting machine so that reconstruction of an election is possible without data re-entry. The same requirement and recommendation applies to vote results generated by each precinct count voting machine.	***Yes***
2.2	Pre-voting Capabilities This subsection defines capabilities required to support functions performed prior to the opening of polls. All voting systems shall provide capabilities to support: • Ballot preparation • Election programming • Ballot and program installation and control • Readiness testing • Verification at the polling place • Verification at the central counting place The standards also include requirements to ensure compatible interfaces with the ballot definition process and the reporting of election results.	***Yes***
2.2.1	Ballot Preparation Ballot preparation is the process of using election databases to define the specific contests, questions, and related instructions to be contained in ballots and to produce all permissible ballot layouts. Ballot preparation requirements include: • General capabilities • Ballot formatting • Ballot production	***Yes***
2.2.1.1	General Capabilities All systems shall provide the general capabilities for ballot preparation. All systems shall be capable of:	***Yes***
2.2.1.1.a	Enabling the automatic formatting of ballots in accordance with the requirements for offices, candidates, and measures qualified to be placed on the ballot for each political subdivision and election district	***Yes***
2.2.1.1.b.i	Collecting and maintaining the following data i. Offices and their associated labels and instructions	***Yes***

Requirement	***Requirement Text***	***Conform***
2.2.1.1.b.ii	Collecting and maintaining the following data ii. Candidate names and their associated labels	***Yes***
2.2.1.1.b.iii.	Collecting and maintaining the following data iii. Issues or measures and their associated text	***Yes***
2.2.1.1.c	Supporting the maximum number of potentially active voting positions as indicated in the system documentation	***Yes***
2.2.1.1.d	For a primary election, generating ballots that segregate the choices in partisan contests by party affiliation	***Yes***
2.2.1.1.e	Generating ballots that contain identifying codes or marks uniquely associated with each format	***Yes***
2.2.1.1.f	Ensuring that vote response fields, selection buttons, or switches properly align with the specific candidate names and/or issues printed on the ballot display, ballot card or sheet, or separate ballot pages	***Yes***
2.2.1.1.g	Paper-based voting systems shall also meet the following requirements applicable to the technology used: Enable voters to make selections by making a mark in areas designated for this purpose upon each ballot sheet	***Yes***
2.2.1.1.h	Paper-based voting systems shall also meet the following requirements applicable to the technology used: For marksense systems, ensure that the timing marks align properly with the vote response fields	***Yes***
2.2.1.2	Ballot Formatting Ballot formatting is the process by which election officials or their designees use election databases and voting system software to define the specific contests and related instructions contained on the ballot and present them in a layout permitted by state law. All voting systems shall provide a capability for:	***Yes***
2.2.1.2.a	Creation of newly defined elections	***Yes***
2.2.1.2.b	Rapid and error-free definition of elections and their associated ballot layouts	***Yes***
2.2.1.2.c	Uniform allocation of space and fonts used for each office, candidate, and contest such that the voter perceives no active voting position to be preferred to any other	***Yes***
2.2.1.2.d	Simultaneous display of the maximum number of choices for a single contest as indicated by the vendor in the system documentation	***Yes***
2.2.1.2.e	Retention of previously defined formats for an election	***Yes***
2.2.1.2.f	Prevention of unauthorized modification of any ballot formats	***Yes***
2.2.1.2.g	Modification by authorized persons of a previously defined ballot format for use in a subsequent election	***Yes***
2.2.1.3	Ballot Production Ballot production is the process of converting ballot formats to a media ready for use in the physical ballot production or electronic presentation. The voting system shall provide a means of printing or otherwise generating a ballot display that can be installed in all voting equipment for which it is intended. All voting systems shall provide the capabilities below.	***Yes***
2.2.1.3.a	The electronic display or printed document on which the user views the ballot is capable of rendering an image of the ballot in any of the languages required by the Voting Rights Act of 1965, as amended.	***Yes***
2.2.1.3.b	The electronic display or printed document on which the user views the ballot does not show any advertising or commercial logos of any kind, whether public service, commercial, or political, unless specifically provided for in state law. Electronic displays shall not provide connection to such material through hyperlink.	***Yes***

Requirement	***Requirement Text***	***Conform***
2.2.1.3.c	The ballot conforms to vendor specifications for type of paper stock, weight, size, shape, size and location of mark field used to record votes, folding, bleed-through, and ink for printing if paper ballot documents or paper displays are part of the system.	***Yes***
2.2.1.3 end	Vendor documentation for marksense systems shall include specifications for ballot materials to ensure that vote selections are read from only a single ballot at a time, without detection of marks from multiple ballots concurrently (e.g., reading of bleed-through from other ballots).	***Yes***
2.2.2	Election Programming Election programming is the process by which election officials or their designees use election databases and vendor system software to logically define the voter choices associated with the contents of the ballots. All systems shall provide for the:	***Yes***
2.2.2.a	Logical definition of the ballot, including the definition of the number of allowable choices for each office and contest	***Yes***
2.2.2.b	Logical definition of political and administrative subdivisions, where the list of candidates or contests varies between polling places	***Yes***
2.2.2.c	Exclusion of any contest on the ballot in which the voter is prohibited from casting a ballot because of place of residence, or other such administrative or geographical criteria	***Yes***
2.2.2.d	Ability to select from a range of voting options to conform to the laws of the jurisdiction in which the system will be used	***Yes***
2.2.2.e	Generation of all required master and distributed copies of the voting program, in conformance with the definition of the ballots for each voting device and polling place, and for each tabulating device	***Yes***
2.2.3	Ballot and Program Installation and Control All systems shall provide a means of installing ballots and programs on each piece of polling place or central count equipment in accordance with the ballot requirements of the election and the requirements of the jurisdiction in which the equipment will be used. All systems shall include the following at the time of ballot and program installation:	***Yes***
2.2.3.a	A detailed work plan or other documentation providing a schedule and steps for the software and ballot installation, which includes a table outlining the key dates, events and deliverables	***Yes***
2.2.3.b	A capability for automatically verifying that the software has been properly selected and installed in the equipment or in programmable memory devices, and for indicating errors	***Yes***
2.2.3.c	A capability for automatically validating that software correctly matches the ballot formats that it is intended to process, for detecting errors, and for immediately notifying an election official of detected errors	***Yes***
2.2.4	Readiness Testing Election personnel conduct voting equipment and voting system readiness tests prior to the start of an election to ensure that the voting system functions properly, to confirm that voting equipment has been properly integrated, and to obtain equipment status reports. All voting systems shall provide the capabilities to:	***Yes***
2.2.4.a.	Verify that voting equipment and precinct count equipment is properly prepared for an election, and collect data that verifies equipment readiness	***Yes***
2.2.4.b.	Obtain status and data reports from each set of equipment	***Yes***
2.2.4.c.	Verify the correct installation and interface of all voting equipment	***Yes***
2.2.4.d.	Verify that hardware and software function correctly	***Yes***
2.2.4.e.	Generate consolidated data reports at the polling place and higher jurisdictional levels	***Yes***
2.2.4.f.	Segregate test data from actual voting data, either procedurally or by hardware/software features	***Yes***

Requirement	***Requirement Text***	***Conform***
	Readiness Testing (cont'd) Resident test software, external devices, and special purpose test software connected to or installed in voting equipment to simulate operator and voter functions may be used for these tests provided that the following standards are met:	***N/A***
2.2.4.g.	These elements shall be capable of being tested separately, and shall be proven to be reliable verification tools prior to their use	***N/A***
2.2.4.h.	These elements shall be incapable of altering or introducing any residual effect on the intended operation of the voting device during any succeeding test and operational phase	***N/A***
2.2.4.i.	Paper-based systems shall: Support conversion testing that uses all potential ballot positions as active positions	***Yes***
2.2.4.j.	Paper-based systems shall: Support conversion testing of ballots with active position density for systems without pre-designated ballot positions	***N/A***
2.2.5	Verification at Polling Place Election officials perform verification at the polling place to ensure that all voting systems and voting equipment function properly before and during an election. All voting systems shall provide a formal record of the following, in any media, upon verification of the authenticity of the command source:	***Yes***
2.2.5.a.	The election's identification data	***Yes***
2.2.5.b.	The identification of all equipment units	***Yes***
2.2.5.c.	The identification of the polling place	***Yes***
2.2.5.d.	The identification of all ballot formats	***Yes***
2.2.5.e.	The contents of each active candidate register by office and of each active measure register at all storage locations (showing that they contain only zeros)	***Yes***
2.2.5.f.	A list of all ballot fields that can be used to invoke special voting options	***Yes***
2.2.5.g.	Other information needed to confirm the readiness of the equipment, and to accommodate administrative reporting requirements.	***Yes***
	Verification at Polling Place (cont'd) To prepare voting devices to accept voted ballots, all voting systems shall provide the capability to test each device prior to opening to verify that each is operating correctly. At a minimum, the tests shall include:	***Yes***
2.2.5.h.	Confirmation that there are no hardware or software failures	***Yes***
2.2.5.i.	Confirmation that the device is ready to be activated for accepting votes	***Yes***
2.2.5.end	If a precinct count system includes equipment for the consolidation of polling place data at one or more central counting locations, it shall have means to verify the correct extraction of voting data from transportable memory devices, or to verify the transmission of secure data over secure communication links.	***Yes***
2.2.6	Verification at the Central Location Election officials perform verification at the central location to ensure that vote counting and vote consolidation equipment and software function properly before and after an election. Upon verification of the authenticity of the command source, any system used in a central count environment shall provide a printed record of the following:	***Yes***
2.2.6.a	The election's identification data	***Yes***
2.2.6.b	The contents of each active candidate register by office and of each active measure register at all storage locations (showing that they contain all zeros)	***Yes***
2.2.6.c	Other information needed to ensure the readiness of the equipment and to accommodate administrative reporting requirements	***Yes***
2.3	Voting Capabilities	***Yes***
2.3	All voting systems shall support: ♦Opening the polls ♦Casting a ballot. Additionally, all DRE systems shall support: ♦Activating the ballot. ♦Augmenting the election counter ♦Augmenting the life-cycle counter.	***Yes (N/A- for DRE)***

Requirement	***Requirement Text***	***Conform***
2.3.1	Opening the Polls The capabilities required for opening the polls are specific to individual voting system technologies. At a minimum, the systems shall provide the functional capabilities indicated below.	***Yes***
2.3.1.1	Precinct Count Systems To allow voting devices to be activated for voting, all precinct count systems shall provide:	***Yes***
2.3.1.1.a	An internal test or diagnostic capability to verify that all of the polling place tests specified in Subsection 2.2.5 have been successfully completed	***Yes***
2.3.1.1.b	Automatic disabling of any device that has not been tested until it has been tested	***Yes***
2.3.1.2	Paper-Based System Requirements To facilitate opening the polls, all paper-based systems shall include:	***Yes***
2.3.1.2.a	A means of verifying that ballot marking devices are properly prepared and ready to use	***Yes***
2.3.1.2.b	A voting booth or similar facility, in which the voter may mark the ballot in privacy;	***Yes***
2.3.1.2.c	Secure receptacles for holding voted ballots	***Yes***
	Paper-Based System Requirements (cont'd) In addition to the above requirements, all paper-based precinct count equipment shall include a means of:	***Yes***
2.3.1.2.d.	Activating the ballot counting device	***Yes***
2.3.1.2.e.	Verifying that the device has been correctly activated and is functioning properly	***Yes***
2.3.1.2.f.	Identifying device failure and corrective action needed	***Yes***
2.3.1.3	DRE System Requirements To facilitate opening the polls, all DRE systems shall include:	***N/A***
2.3.1.3.a	A security seal, a password, or a data code recognition capability to prevent the inadvertent or unauthorized actuation of the poll-opening function	***N/A***
2.3.1.3.b	A means of enforcing the execution of steps in the proper sequence if more than one step is required	***N/A***
2.3.1.3.c	A means of verifying the system has been activated correctly	***N/A***
2.3.1.3.d	A means of identifying system failure and any corrective action needed	***N/A***
2.3.2	Activating the Ballot (DRE Systems) To activate the ballot, all DRE systems shall:	***N/A***
2.3.2.a	Enable election officials to control the content of the ballot presented to the voter, whether presented in printed form or electronic display, such that each voter is permitted to record votes only in contests in which that voter is authorized to vote	***N/A***
2.3.2.b	Allow each eligible voter to cast a ballot	***N/A***
2.3.2.c	Prevent a voter from voting on a ballot to which he or she is not entitled	***N/A***
2.3.2.d	Prevent a voter from casting more than one ballot in the same election	***N/A***
2.3.2.e	Activate the casting of a ballot in a general election	***N/A***
2.3.2.f	Enable the selection of the ballot that is appropriate to the party affiliation declared by the voter in a primary election	***N/A***
2.3.2.g	Activate all portions of the ballot upon which the voter is entitled to vote	***N/A***
2.3.2.h	Disable all portions of the ballot upon which the voter is not entitled to vote	***N/A***
2.3.3	Casting a Ballot Some required capabilities for casting a ballot are common to all systems. Others are specific to individual voting technologies or intended use. Systems must provide additional functional capabilities that enable accessibility to disabled voters as defined in Subsection 3.2.	***N/A***
2.3.3.1	Common Requirements To facilitate casting a ballot, all systems shall:	***Yes***
2.3.3.1.a	Provide text that is at least 3 millimeters high and provide the capability to adjust or magnify the text to an apparent size of 6.3 millimeters	***Yes***
2.3.3.1.b	Protect the secrecy of the vote such that the system cannot reveal any information about how a particular voter voted, except as otherwise required by individual state law	***Yes***
2.3.3.1.c	Record the selection and non-selection of individual vote choices for each contest and ballot measure	***Yes***

Requirement	***Requirement Text***	***Conform***
2.3.3.1.d	Record the voter's selection of candidates whose names do not appear on the ballot, if permitted under state law, and record as many write-in votes as the number of candidates the voter is allowed to select	***Yes***
2.3.3.1.e	In the event of a failure of the main power supply external to the voting system, provide the capability for any voter who is voting at the time to complete casting a ballot, allow for the successful shutdown of the voting system 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	***Yes***
2.3.3.1.f	Provide the capability for voters to continue casting ballots in the event of a failure of a telecommunications connection within the polling place or between the polling place and any other location	***Yes***
2.3.3.2	Paper-Based System Requirements All paper-based systems shall:	***Yes***
2.3.3.2.a	Allow the voter to easily identify the voting field that is associated with each candidate or ballot measure response	***Yes***
2.3.3.2.b	Allow the voter to mark the ballot to register a vote	***Yes***
2.3.3.2.c	Allow either the voter or the appropriate election official to place the voted ballot into the ballot counting device (for precinct count systems) or into a secure receptacle (for central count systems)	***Yes***
2.3.3.2.d	Protect the secrecy of the vote throughout the process	***Yes***
	Paper-Based System Requirements (cont'd) In addition to the above requirements, all paper-based precinct count systems shall:	***Yes***
2.3.3.2.e.	Provide feedback to the voter that identifies specific contests for which he or she has made no selection or fewer than the allowable number of selections (e.g., undervotes)	***Yes***
2.3.3.2.f.	Notify the voter if he or she has made more than the allowable number of selections for any contest (e.g., overvotes)	***Yes***
2.3.3.2.g.	Notify the voter before the ballot is cast and counted of the effect of making more than the allowable number of selections for a contest	***Yes***
2.3.3.2.h.	Provide the voter opportunity to correct the ballot for either an undervote or overvote before the ballot is cast and counted	***Yes***
2.3.3.3	DRE System Requirements In addition to the above common requirements, DRE systems shall:	***N/A***
2.3.3.3.a.	Prohibit the voter from accessing or viewing any information on the display screen that has not been authorized by election officials and preprogrammed into the voting system (i.e., no potential for display of external information or linking to other information sources)	***N/A***
2.3.3.3.b.	Enable the voter to easily identify the selection button or switch, or the active area of the ballot display, that is associated with each candidate or ballot measure response	***N/A***
2.3.3.3.c.	Allow the voter to select his or her preferences on the ballot in any legal number and combination	***N/A***
2.3.3.3.d.	Indicate that a selection has been made or canceled	***N/A***
2.3.3.3.e.	Indicate to the voter when no selection, or an insufficient number of selections, has been made for a contest (e.g., undervotes)	***N/A***
2.3.3.3.f.	Notify the voter if he or she has made more than the allowable number of selections for any contest (e.g., overvotes)	***N/A***
2.3.3.3.g.	Notify the voter before the ballot is cast and counted of the effect of making more than the allowable number of selections for a contest	***N/A***
2.3.3.3.h	Provide the voter opportunity to correct the ballot for either an undervote or overvote before the ballot is cast and counted	***N/A***
2.3.3.3.i.	Notify the voter when the selection of candidates and measures is completed	***N/A***
2.3.3.3.j.	Allow the voter, before the ballot is cast, to review his or her choices and, if the voter desires, to delete or change his or her choices before the ballot is cast	***N/A***

Requirement	*Requirement Text*	*Conform*
2.3.3.3.k.	For electronic image displays, prompt the voter to confirm the voter's choices before casting his or her ballot, signifying to the voter that casting the ballot is irrevocable and directing the voter to confirm the voter's intention to cast the ballot	***N/A***
2.3.3.3.l.	Notify the voter after the vote has been stored successfully that the ballot has been cast	***N/A***
2.3.3.3.m.	Notify the voter that the ballot has not been cast successfully if it is not stored successfully, including storage of the ballot image, and provide clear instruction as to the steps the voter should take to cast his or her ballot should this event occur	***N/A***
2.3.3.3.n.	Provide sufficient computational performance to provide responses back to each voter entry in no more than three seconds	***N/A***
2.3.3.3.o.	Ensure that the votes stored accurately represent the actual votes cast	***N/A***
2.3.3.3.p.	Prevent modification of the voter's vote after the ballot is cast	***N/A***
2.3.3.3.q.	Provide a capability to retrieve ballot images in a form readable by humans [in accordance with the requirements of Subsections 2.1.2 (f) and 2.1.4 (k) and (l)]	***N/A***
2.3.3.3.r.	Increment the proper ballot position registers or counters	***N/A***
2.3.3.3.s.	Protect the secrecy of the vote throughout the voting process	***N/A***
2.3.3.3.t.	Prohibit access to voted ballots until after the close of polls	***N/A***
2.3.3.3.u.	Provide the ability for election officials to submit test ballots for use in verifying the end-to-end integrity of the voting system	***N/A***
2.3.3.3.v.	Isolate test ballots such that they are accounted for accurately in vote counts and are not reflected in official vote counts for specific candidates or measures	***N/A***
2.4	Post-Voting Capabilities All voting systems shall provide capabilities to accumulate and report results for the jurisdiction and to generate audit trails. In addition, precinct count voting systems must provide a means to close the polls including generating appropriate reports. If the system provides the capability to broadcast results, additional standards apply.	***Yes***
2.4.1	Closing the Polls These requirements for closing the polls and locking voting systems against future voting are specific to precinct count systems. The voting system shall provide the means for:	***Yes***
2.4.1.a	Preventing the further casting of ballots once the polls has closed	***Yes***
2.4.1.b	Providing an internal test that verifies that the prescribed closing procedure has been followed, and that the device status is normal	***Yes***
2.4.1.c	Incorporating a visible indication of system status	***Yes***
2.4.1.d	Producing a diagnostic test record that verifies the sequence of events, and indicates that the extraction of voting data has been activated	***Yes***
2.4.1.e	Precluding the unauthorized reopening of the polls once the poll closing has been completed for that election	***Yes***
2.4.2	Consolidating Vote Data	***Yes***
2.4.2	All systems shall provide a means to consolidate vote data from all polling places, and optionally from other sources such as absentee ballots, provisional ballots, and voted ballots requiring human review (e.g., write-in votes).	***Yes***
2.4.3	Producing Reports All systems shall be able to create reports summarizing the vote data on multiple levels. All systems shall provide capabilities to:	***Yes***
2.4.3.a	Support geographic reporting, which requires the reporting of all results for each contest at the precinct level and additional jurisdictional levels	***Yes***
2.4.3.b	Produce a printed report of the number of ballots counted by each tabulator	***Yes***
2.4.3.c	Produce a printed report for each tabulator of the results of each contest that includes the votes cast for each selection, the count of undervotes, and the count of overvotes	***Yes***

Requirement	***Requirement Text***	***Conform***
2.4.3.d	Produce a consolidated printed report of the results for each contest of all votes cast (including the count of ballots from other sources supported by the system as specified by the vendor) that includes the votes cast for each selection, the count of undervotes, and the count of overvotes	***Yes***
2.4.3.e	Be capable of producing a consolidated printed report of the combination of overvotes for any contest that is selected by an authorized official (e.g., the number of overvotes in a given contest combining candidate A and candidate B, combining candidate A and candidate C, etc.)	***Yes***
2.4.3.f	Produce all system audit information required in Subsection 5.4 in the form of printed reports, or in electronic memory for printing centrally	***Yes***
2.4.3.g	Prevent data from being altered or destroyed by report generation, or by the transmission of results over telecommunications lines	***Yes***
2.4.3	Producing Reports (cont'd) All systems shall be able to create reports summarizing the vote data on multiple levels. In addition, all precinct count voting systems shall:	***Yes***
2.4.3.h.	Prevent the printing of reports and the unauthorized extraction of data prior to the official close of the polls	***Yes***
2.4.3.i.	Provide a means to extract information from a transportable programmable memory device or data storage medium for vote consolidation	***Yes***
2.4.3.j.	Consolidate the data contained in each unit into a single report for the polling place when more than one voting machine or precinct tabulator is used	***Yes***
2.4.3.k.	Prevent data in transportable memory from being altered or destroyed by report generation, or by the transmission of official results over telecommunications lines	***Yes***
2.4.4	Broadcasting Results (Optional capability; if supported by the vendor) Some voting systems offer the capability to make unofficial results available to external organizations such as the news media, political party officials, and others. Although this capability is not required, systems that make unofficial results available shall	***Yes***
2.4.4.a	Provide only aggregated results, and not data from individual ballots	***Yes***
2.4.4.b	Provide no access path from unofficial electronic reports or files to the storage devices for official data	***Yes***
2.4.4.c	Clearly indicate on each report or file that the results it contains are unofficial	***Yes***
2.5	Maintenance, Transportation, and Storage All systems shall be designed and manufactured to facilitate preventive and corrective maintenance, conforming to the hardware standards described in Subsection 4.1. All vote casting and tally equipment designated for storage between elections shall:	***Yes***
2.5.a	Function without degradation in capabilities after transit to and from the place of use, as demonstrated by meeting the performance standards described in Subsection 4.1	***Yes***
2.5.b	Function without degradation in capabilities after storage between elections, as demonstrated by meeting the performance standards described in Subsection 4.1	***Yes***
3.1	Usability and Accessibility Requirements	***Yes***
3.1.1	Usability Testing	***Yes***

Requirement	***Requirement Text***	***Conform***
	The vendor shall conduct summative usability tests on the voting system using individuals representative of the general population. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification. Discussion: Voting system developers are required to conduct realistic usability tests on the final product. For the present, vendors can define their own testing protocols. Future revisions to the Guidelines will include requirements for usability testing that will provide specific performance benchmarks.	***Yes***
3.1.2	Functional Capabilities The voting process shall provide certain functional capabilities to support voter usability.	***Yes***
3.1.2.a	The voting system shall provide feedback to the voter that identifies specific contests or ballot issues for which he or she has made no selection or fewer than the allowable number of selections (e.g., undervotes)	***Yes***
3.1.2.b	The voting system shall notify the voter if he or she has made more than the allowable number of selections for any contest (e.g., overvotes)	***Yes***
3.1.2.c	The voting system shall notify the voter before the ballot is cast and counted of the effect of making more than the allowable number of selections for a contest	***Yes***
3.1.2.d	The voting system shall provide the voter the opportunity to correct the ballot for either an undervote or overvote before the ballot is cast and counted	***Yes***
3.1.2.e	The voting system shall allow the voter, at his or her choice, to submit an undervoted or overvoted ballot without correction	***Yes***
3.1.2.f	DRE voting machines shall allow the voter to change a vote within a contest before advancing to the next contest. Discussion: The point here is that voters using a DRE should not have to wait for the final ballot review screen in order to change a vote.	***N/A***
3.1.2.g	DRE voting machines should provide navigation controls that allow the voter to advance to the next contest or go back to the previous contest before completing a vote on the contest currently being presented (whether visually or aurally). Discussion: For example, the voter should not be forced to proceed sequentially through all the contests before going back to check his or her selection for a previous contest.	***N/A***
3.1.4	Cognitive Issues The voting process shall be designed to minimize cognitive difficulties for the voter.	***Yes***
3.1.4.a	Consistent with election law, the voting system should support a process that does not introduce any bias for or against any of the selections to be made by the voter. In both visual and aural formats, contest choices shall be presented in an equivalent manner. Discussion: Certain differences in presentation are mandated by state law, such as the order in which candidates are listed and provisions for voting for write-in candidates. But comparable characteristics such as font size or voice volume and speed must be the same for all choices.	***Yes***
3.1.4.b	The voting machine or related materials shall provide clear instructions and assistance to allow voters to successfully execute and cast their ballots independently. Discussion: Voters should not routinely need to ask for human assistance.	***Yes***
3.1.4.b.i	Voting machines or related materials shall provide a means for the voter to get help at any time during the voting session. Discussion: The voter should always be able to get help if needed. DRE voting machines may provide this with a distinctive "help" button. Any type of voting equipment may provide written instructions that are separate from the ballot.	***Yes***
3.1.4.b.ii	The voting machine shall provide instructions for all its valid operations. Discussion: If an operation is available to the voter, it must be documented. Examples include how to change a vote, how to navigate among contests, how to cast a straight party vote, and how to cast a write-in vote.	***Yes***

Requirement	***Requirement Text***	***Conform***
3.1.4.c	The voting system shall provide the capability to design a ballot for maximum clarity and comprehension.	***Yes***
3.1.4.c.i	The voting equipment should not visually present a single contest spread over two pages or two columns. Discussion: Such a visual separation poses the risk that the voter may perceive one contest as two. If a contest has a large number of candidates, it may be infeasible to observe this guideline.	***Yes***
3.1.4.c.ii	The ballot shall clearly indicate the maximum number of candidates for which one can vote within a single contest.	***Yes***
3.1.4.c.iii	There shall be a consistent relationship between the name of a candidate and the mechanism used to vote for that candidate. Discussion: For example, if the response field where voters indicate their selections is located to the left of a candidate's name, then each response field shall be located to the left of the associated candidates' names.	***Yes***
3.1.4.d	Warnings and alerts issued by the voting system should clearly state the nature of the problem and the set of responses available to the voter. The warning should clearly state whether the voter has performed or attempted an invalid operation or whether the voting equipment itself has malfunctioned in some way. Discussion: In case of an equipment failure, the only action available to the voter might be to get assistance from a poll worker.	***Yes***
3.1.4.e	The use of color by the voting system should agree with common conventions: (a) green, blue or white is used for general information or as a normal status indicator; (b) amber or yellow is used to indicate warnings or a marginal status; (c) red is used to indicate error conditions or a problem requiring immediate attention.	***Yes***
3.1.5	Perceptual Issues The voting process shall be designed to minimize perceptual difficulties for the voter.	***Yes***
3.1.5.a	No voting machine display screen shall flicker with a frequency between 2 Hz and 55 Hz. Discussion: Aside from usability concerns, this requirement protects voters with epilepsy.	***Yes***
3.1.5.b	Any aspect of the voting machine that is adjustable by the voter or poll worker, including font size, color, contrast, and audio volume, shall automatically reset to a standard default value upon completion of that voter's session. Discussion: The voting machine must present the same initial appearance to every voter.	***Yes***
3.1.5.c	If any aspect of a voting machine is adjustable by the voter or poll worker, there shall be a mechanism to reset all such aspects to their default values. Discussion: The purpose is to allow a voter who has adjusted the machine into an undesirable state to reset all the aspects to begin again.	***Yes***
3.1.5.d	All electronic voting machines shall provide a minimum font size of 3.0 mm (measured as the height of a capital letter) for all text.	***Yes***
3.1.5.e	All voting machines using paper ballots should make provisions for voters with poor reading vision. Discussion: Possible solutions include: (a) providing paper ballots in at least two font sizes, 3.0-4.0mm and 6.3-9.0mm and (b) providing a magnifying device.	***Yes***
3.1.5.f	The default color coding shall maximize correct perception by voters with color blindness. Discussion: There are many types of color blindness and no color coding can, by itself, guarantee correct perception for everyone. However, designers should take into account such factors as: red-green color blindness is the most common form; high luminosity contrast will help colorblind voters to recognize visual features; and color-coded graphics can also use shape to improve the ability to distinguish certain features.	***Yes***
3.1.5.g	Color coding shall not be used as the sole means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. Discussion: While color can be used for emphasis, some other non-color mode must also be used to convey the information, such as a shape or text style. For example, red can be enclosed in an octagon shape.	***Yes***

Requirement	***Requirement Text***	***Conform***
3.1.5.h	All text intended for the voter should be presented in a sans serif font. Discussion: Experimentation has shown that users prefer such a font and the legibility of serif and sans serif fonts is equivalent.	***Yes***
3.1.5.i	The minimum figure-to-ground ambient contrast ratio for all text and informational graphics (including icons) intended for the voter shall be 3:1.	***Yes***
3.1.6	Interaction Issues The voting process shall be designed to minimize interaction difficulties for the voter.	***Yes***
3.1.6.a	Voting machines with electronic image displays shall not require page scrolling by the voter. Discussion: This is not an intuitive operation for those unfamiliar with the use of computers. Even those experienced with computers often do not notice a scroll bar and miss information at the bottom of the "page." Voting systems may require voters to move to the next or previous page." "	***Yes***
3.1.6.b	The voting machine shall provide unambiguous feedback regarding the voter's selection, such as displaying a checkmark beside the selected option or conspicuously changing its appearance.	***Yes***
3.1.6.c	If the voting machine requires a response by a voter within a specific period of time, it shall issue an alert at least 20 seconds before this time period has expired and provide a means by which the voter may receive additional time.	***Yes***
3.1.6.d	Input mechanisms shall be designed to minimize accidental activation.	***Yes***
3.1.6.d.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.	***Yes***
3.1.6.d.ii	No key or control on a voting machine shall have a repetitive effect as a result of being held in its active position. Discussion: This is to preclude accidental activation. For instance, if a voter is typing in the name of a write-in candidate, depressing and holding the "e" key results in only a single "e" added to the name.	***Yes***
3.1.7	Privacy	***Yes***
3.1.7	The voting process shall preclude anyone else from determining the content of a voter's ballot, without the voter's cooperation. Discussion: Privacy ensures that the voter can make selections based solely on his or her own preferences without intimidation or inhibition. Among other practices, this forbids the issuance of a receipt to the voter that would provide proof of how he or she voted.	***Yes***
3.1.7.1	Privacy at the Polls When deployed according to the installation instructions provided by the vendor, the voting station shall prevent others from observing the contents of a voter's ballot.	***Yes***
3.1.7.1.a	The ballot and any input controls shall be visible only to the voter during the voting session and ballot submission.	***Yes***
3.1.7.1.b	The audio interface shall be audible only to the voter. Discussion: Voters who are hard of hearing but need to use an audio interface may also need to increase the volume of the audio. Such situations require headphones with low sound leakage.	***Yes***
3.1.7.1.c	As mandated by HAVA 301 (a)(1)(C), the voting system shall notify the voter of an attempted overvote in a way that preserves the privacy of the voter and the confidentiality of the ballot.	***Yes***
3.1.7.2	No Recording of Alternate Format Usage Voter anonymity shall be maintained for alternative format ballot presentation.	***Yes***
3.1.7.2.a	No information shall be kept within an electronic cast vote record that identifies any alternative language feature(s) used by a voter.	***Yes***
3.1.7.2.b	No information shall be kept within an electronic cast vote record that identifies any accessibility feature(s) used by a voter.	***Yes***
3.2	Accessibility Requirements	***Yes***

Requirement	***Requirement Text***	***Conform***
3.2.1	General The voting process shall incorporate the following features that are applicable to all types of disabilities:	***Yes***
3.2.1.a	When the provision of accessibility involves an alternative format for ballot presentation, then all information presented to voters including instructions, warnings, error and other messages, and ballot choices shall be presented in that alternative format.	***Yes***
3.2.1.b	The support provided to voters with disabilities shall be intrinsic to the accessible voting station. It shall not be necessary for the accessible voting station to be connected to any personal assistive device of the voter in order for the voter to operate it correctly.	***Yes***
	Discussion: This requirement does not preclude the accessible voting station from providing interfaces to assistive technology. [See definition of "personal assistive devices" in the Glossary.] Its purpose is to assure that disabled voters are not required to bring special devices with them in order to vote successfully. The requirement does not assert that the accessible voting station will obviate the need for a voter's ordinary non-interfacing devices, such as eyeglasses or canes. Jurisdictions should ensure that an accessible voting station provides clean and sanitary devices for voters with dexterity disabilities.	***Yes***
3.2.1.c	When the primary means of voter identification or authentication uses biometric measures that require a voter to possess particular biological characteristics, the voting process shall provide a secondary means that does not depend on those characteristics. Discussion: For example, if fingerprints are used for voter identification, another mechanism shall be provided for voters without usable fingerprints.	***N/A***
3.2.2	Vision	***Yes***
3.2.2	The voting process shall be accessible to voters with visual disabilities. Discussion: Note that all aspects of the voting process are to be accessible, not just the voting machine.	***Yes***
3.2.2.1	Partial Vision	***Yes***
3.2.2.1.a	The vendor shall conduct summative usability tests on the voting system using partially sighted individuals. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification. Discussion: Voting system developers are required to conduct realistic usability tests on the final product. For the present, vendors can define their own testing protocols. Future revisions to the Guidelines will include requirements for usability testing that will provide specific performance benchmarks.	***Yes***
3.2.2.1.b	The accessible voting station with an electronic image display shall be capable of showing all information in at least two font sizes, (a) 3.0-4.0 mm and (b) 6.3-9.0 mm, under control of the voter. Discussion: All millimeters will be calculated using Hard Metric Conversion. [See Glossary for definition.] While larger font sizes may assist most voters with poor vision, certain disabilities such as tunnel vision are best addressed by smaller font sizes.	***Yes***
3.2.2.1.c	An accessible voting station with a monochrome-only electronic image display shall be capable of showing all information in high contrast either by default or under the control of the voter or poll worker. High contrast is a figure-to-ground ambient contrast ratio for text and informational graphics of at least 6:1.	***Yes***
3.2.2.1.d	An accessible voting station with a color electronic image display shall allow the voter to adjust the color or the figure-to-ground ambient contrast ratio. Discussion: See Technical Guide for Color, Contrast and Text Size in Appendix D for examples of how a voting station may meet this requirement by offering a limited number of discrete choices. In particular, it is not required that the station offer a continuous range of color or contrast values.	***Yes***

Requirement	***Requirement Text***	***Conform***
3.2.2.1.e	Buttons and controls on accessible voting stations shall be distinguishable by both shape and color. Discussion: The redundant cues have been found to be helpful to those with partial vision.	***Yes***
3.2.2.1.f	An accessible voting station using an electronic image display shall provide synchronized audio output to convey the same information as that which is displayed on the screen. Discussion: The redundant cues are helpful to those with low vision. They are also helpful to individuals who may have difficulty reading the text on the screen.	***Yes***
3.2.2.2	Blindness	***Yes***
3.2.2.2.a	The vendor shall conduct summative usability tests on the voting system using individuals who are blind. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification. Discussion: Voting system developers are required to conduct realistic usability tests on the final product. For the present, vendors can define their own testing protocols. Future revisions to the Guidelines will include requirements for usability testing that will provide specific performance benchmarks.	***Yes***
3.2.2.2.b	The accessible voting station shall provide an audio-tactile interface (ATI) that supports the full functionality of the visual ballot interface, as specified in Subsection 2.3.3. Discussion: Note the necessity of both audio output and tactilely discernible controls for voter input. Full functionality includes at least:	***Yes***
	Instructions and feedback on initial activation of the ballot (such as insertion of a smart card)	***Yes***
3.2.2.2.b.i	The ATI of the accessible voting station shall provide the same capabilities to vote and cast a ballot as are provided by other voting machines or by the visual interface of the standard voting machine. Discussion: For example, if a visual ballot supports voting a straight party ticket and then changing the choice in a single contest, so must the ATI.	***Yes***
3.2.2.2.b.ii	The ATI shall allow the voter to have any information provided by the voting system repeated.	***Yes***
3.2.2.2.b.iii	The ATI shall allow the voter to pause and resume the audio presentation.	***Yes***
3.2.2.2.iv	The ATI shall allow the voter to skip to the next contest or return to previous contests. Discussion: This is analogous to the ability of sighted voters to move on to the next contest once they have made a selection or to abstain from voting on a contest altogether.	***Yes***
3.2.2.2.v	The ATI shall allow the voter to skip over the reading of a referendum so as to be able to vote on it immediately. Discussion: This is analogous to the ability of sighted voters to skip over the wording of a referendum on which they have already made a decision prior to the voting session (e.g., "Vote yes on proposition #123").	***Yes***
3.2.2.2.c	All voting stations that provide audio presentation of the ballot shall conform to the following requirements: Discussion: These requirements apply to all voting machine audio output, not just to the ATI of an accessible voting station.	***Yes***
3.2.2.2.c.i	The ATI shall provide its audio signal through an industry standard connector for private listening using a 3.5mm stereo headphone jack to allow voters to use their own audio assistive devices.	***Yes***
3.2.2.2.c.i	When a voting machine utilizes a telephone style handset or headphone to provide audio information, it shall provide a wireless T-Coil coupling for assistive hearing devices so as to provide access to that information for voters with partial hearing. That coupling shall achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.	***N/A***

Requirement	***Requirement Text***	***Conform***
3.2.2.2.c.ii	No voting equipment shall cause electromagnetic interference with assistive hearing devices that would substantially degrade the performance of those devices. The voting equipment, considered as a wireless device, shall achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19. Discussion: Hearing devices" include hearing aids and cochlear implants. "	***Yes***
3.2.2.2.c.iv	A sanitized headphone or handset shall be made available to each voter. Discussion: This requirement can be achieved in various ways, including the use of throwaway" headphones	***Yes***
3.2.2.2.c.v	The voting machine shall set the initial volume for each voter between 40 and 50 dB SPL. Discussion: A voter does not "inherit" the volume as set by the previous user of the voting station.	***Yes***
3.2.2.2.c.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.	***Yes***
3.2.2.2.c.vii	The audio system shall be able to reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.	***Yes***
3.2.2.2.c.viii	The audio presentation of verbal information should be readily comprehensible by voters who have normal hearing and are proficient in the language. This includes such characteristics as proper enunciation, normal intonation, appropriate rate of speech, and low background noise. Candidate names should be pronounced as the candidate intends.	***Yes***
3.2.2.2.c.ix	The audio system shall allow voters to control the rate of speech. The range of speeds supported should be at least 75% to 200% of the nominal rate. Discussion: Many blind voters are accustomed to interacting with accelerated speech.	***Yes***
3.2.2.2.d	If the normal procedure is to have voters initialize the activation of the ballot, the accessible voting station shall provide features that enable voters who are blind to perform this activation. Discussion: For example, smart cards might provide tactile cues so as to allow correct insertion.	***Yes***
3.2.2.2.e	If the normal procedure is for voters to submit their own ballots, then the accessible voting station shall provide features that enable voters who are blind to perform this submission. Discussion: For example, if voters normally feed their own optical scan ballots into a reader, blind voters should also be able to do so.	***Yes***
3.2.2.2.f	All mechanically operated controls or keys on an accessible voting station shall be tactilely discernible without activating those controls or keys.	***Yes***
3.2.2.2.g	On an accessible voting station, the status of all locking or toggle controls or keys (such as the shift" key) shall be visually discernible	***Yes***
3.2.3	Dexterity	***Yes***
3.2.3.a	The vendor shall conduct summative usability tests on the voting system using individuals lacking fine motor control. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification. Discussion: Voting system developers are required to conduct realistic usability tests on the final product. For the present, vendors can define their own testing protocols. Future revisions to the Guidelines will include requirements for usability testing that will provide specific performance benchmarks.	***Yes***
3.2.3.b	All keys and controls on the accessible voting station shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys shall be no greater 5 lbs. (22.2 N). Discussion: Controls are to be operable without excessive force.	***Yes***

Requirement	***Requirement Text***	***Conform***
3.2.3.c	The accessible voting station controls shall not require direct bodily contact or for the body to be part of any electrical circuit. Discussion: This requirement ensures that controls are operable by individuals using prosthetic devices.	***Yes***
3.2.3.d	The accessible voting station shall provide a mechanism to enable non-manual input that is functionally equivalent to tactile input. Discussion: This requirement ensures that the accessible voting station is operable by individuals who do not have the use of their hands. All the functionality of the accessible voting station (e.g., straight party voting, write-in candidates) that is available through the other forms of input, such as tactile, must also be available through a non-manual input mechanism if it is provided by the accessible voting station.	***Yes***
3.2.3.e	If the normal procedure is for voters to submit their own ballots, then the accessible voting station shall provide features that enable voters who lack fine motor control or the use of their hands to perform this submission.	***Yes***
3.2.4	Mobility The voting process shall be accessible to voters who use mobility aids, including wheelchairs.	***Yes***
3.2.4.a	The accessible voting station shall provide a clear floor space of 30 inches (760 mm) minimum by 48 inches (1220 mm) minimum for a stationary mobility aid. The clear floor space shall be level with no slope exceeding 1:48 and positioned for a forward approach or a parallel approach.	***Yes***
3.2.4.b	All controls, keys, audio jacks and any other part of the accessible voting station necessary for the voter to operate the voting machine shall be within reach as specified under the following sub-requirements: Discussion: Note that these requirements have meaningful application mainly to controls in a fixed location. A hand-held tethered control panel is another acceptable way of providing reachable controls.	***Yes***
3.2.4.c	If the accessible voting station has a forward approach with no forward reach obstruction then the high reach shall be 48 inches maximum and the low reach shall be 15 inches minimum. See Figure 1.	***Yes***
3.2.4.d	If the accessible voting station has a forward approach with a forward reach obstruction, the following requirements apply: See Figure 2.	***Yes***
3.2.4.d.i.	The forward obstruction shall be no greater than 25 inches in depth, its top no higher than 34 inches and its bottom surface no lower than 27 inches.	***Yes***
3.2.4.d.ii.	If the obstruction is no more than 20 inches in depth, then the maximum high reach shall be 48 inches, otherwise it shall be 44 inches.	***Yes***
3.2.4.d.iii.	Space under the obstruction between the finish floor or ground and 9 inches (230 mm) above the finish floor or ground shall be considered toe clearance and shall comply with the following provisions: Toe clearance shall extend 25 inches (635 mm) maximum under the obstruction " The minimum toe clearance under the obstruction shall be either 17 inches (430 mm) or the depth required to reach over the obstruction to operate the accessible voting station	***Yes***

Requirement	***Requirement Text***	***Conform***
3.2.4.d.iv.	Space under the obstruction between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground shall be considered knee clearance and shall comply with the following provisions: Knee clearance shall extend 25 inches (635 mm) maximum under the obstruction at 9 inches (230 mm) above the finish floor or ground. " • The minimum knee clearance at 9 inches (230 mm) above the finish floor or ground shall be either 11 inches (280 mm) or 6 inches less than the toe clearance, whichever is greater. • Between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground, the knee clearance shall be permitted to reduce at a rate of 1 inch (25 mm) in depth for each 6 inches (150 mm) in height. Discussion: It follows that the minimum knee clearance at 27 inches above the finish floor or ground shall be 3 inches less than the minimum knee clearance at 9 inches above the floor. • Knee clearance shall be 30 inches (760 mm) wide minimum.	***Yes***
3.2.4.e	If the accessible voting station has a parallel approach with no side reach obstruction then the maximum high reach shall be 48 inches and the minimum low reach shall be 15 inches. See Figure 3.	***Yes***
3.2.4.f	If the accessible voting station has a parallel approach with a side reach obstruction, the following sub-requirements apply. See Figure 4.	***Yes***
3.2.4.f.i	The side obstruction shall be no greater than 24 inches in depth and its top no higher than 34 inches.	***Yes***
3.2.4.f.ii	If the obstruction is no more than 10 inches in depth, then the maximum high reach shall be 48 inches, otherwise it shall be 46 inches. Discussion: Since this is a parallel approach, no clearance under the obstruction is required.	***Yes***
3.2.4.g	All labels, displays, controls, keys, audio jacks, and any other part of the accessible voting station necessary for the voter to operate the voting machine shall be easily legible and visible to a voter in a wheelchair with normal eyesight (no worse than 20/40, corrected) who is in an appropriate position and orientation with respect to the accessible voting station Discussion: There are a number of factors that could make relevant parts of the accessible voting station difficult to see such as; small lettering, controls and labels tilted at an awkward angle from the voter's viewpoint, and glare from overhead lighting.	***Yes***
3.2.5	Hearing The voting process shall be accessible to voters with hearing disabilities.	***Yes***
3.2.5.a	The accessible voting station shall incorporate the features listed under requirement 3.2.2.2 (c) for voting equipment that provides audio presentation of the ballot to provide accessibility to voters with hearing disabilities. Discussion: Note especially the requirements for volume initialization and control.	***Yes***
3.2.5.b	If voting equipment provides sound cues as a method to alert the voter, the tone shall be accompanied by a visual cue, unless the station is in audio-only mode. Discussion: For instance, the voting equipment might beep if the voter attempts to overvote. If so, there would have to be an equivalent visual cue, such as the appearance of an icon, or a blinking element. Some voting equipment may have an audio-only mode, in which case, there would be no visual cue.	***Yes***
3.2.6	Speech The voting process shall be accessible to voters with speech disabilities.	***Yes***
3.2.6.a	No voting equipment shall require voter speech for its operation. Discussion: This does not preclude voting equipment from offering speech input as an option, but speech must not be the only means of input.	***Yes***
3.2.7	English Proficiency	***Yes***
3.2.7	For voters who lack proficiency in reading English, or whose primary language is unwritten, the voting equipment shall provide spoken instructions and ballots in the preferred language of the voter, consistent with state and federal law. The requirements of 3.2.2.2 (c) shall apply to this mode of interaction.	***Yes***

Requirement	***Requirement Text***	***Conform***
3.2.8	Cognition	***Yes***
3.2.8	The voting process should be accessible to voters with cognitive disabilities. Discussion: At present there are no design features specifically aimed at helping those with cognitive disabilities. Requirements 3.2.2.1 (f), the synchronization of audio with the screen in a DRE, is helpful for some cognitive disabilities such as dyslexia. Requirements in Subsection 3.1.4 also address cognitive issues relative to voting system usability.	***Yes***
4	Hardware Requirements This section contains the requirements for the machines and manufactured devices that are part of a voting system. It specifies minimum values for certain performance characteristics; physical characteristics; and design, construction, and maintenance characteristics for the hardware and selected related components of all voting systems, such as: Ballot printers " Ballot cards and sheets " Ballot displays " Voting devices • Removable electronic data storage media • Servers • Printers This section applies to the combination of software and hardware to accomplish specific performance and system control requirements. Standards that are specific to software alone are provided in Section 5. The requirements of this section apply generally to all hardware used in voting systems, including: • Hardware provided by the voting system vendor and its suppliers • Hardware furnished by an external provider (for example, providers of commercial-off-the-shelf equipment) where the hardware may be used in any way during voting system operation • Hardware provided by the voting jurisdiction	***Yes***
4.1	Performance Requirements The performance requirements address a broad range of parameters, encompassing: Accuracy requirements	***Yes***
4.1	Performance requirements for voting systems represent the combined operational capability of both system hardware and software. Accuracy, as measured by data error rate, and operational failure are treated as distinct attributes in performance testing. All systems shall meet the performance requirements under operating conditions and after storage under non-operating conditions.	***Yes***
4.1.1	Accuracy Requirements Voting system accuracy addresses the accuracy of data for each of the individual ballot positions that could be selected by a voter, including the positions that are not selected. For a voting system, accuracy is defined as the ability of the system to capture, record, store, consolidate and report the specific selections and absence of selections, made by the voter for each ballot position without error. Required accuracy is defined in terms of an error rate that for testing purposes represents the maximum number of errors allowed while processing a specified volume of data. This rate is set at a sufficiently stringent level that the likelihood of voting system errors affecting the outcome of an election is exceptionally remote even in the closest of elections. The error rate is defined using a convention that recognizes differences in how vote data is processed by different types of voting systems. Paper-based and DRE systems have different processing steps. Some differences also exist between precinct count and central count systems. Therefore, the acceptable error rate applies separately and distinctly to each of the following functions:	***Yes***
4.1.1.a	For all paper-based voting systems:	***Yes***
4.1.1.a.i	Scanning ballot positions on paper ballots to detect selections for individual candidates and contests	***Yes***
4.1.1.a.ii	Conversion of selections detected on paper ballots into digital data	***Yes***
4.1.1.b	For all DRE voting systems:	***N/A***
4.1.1.b.i	Recording the voter selections of candidates and contests into voting data storage	***N/A***
4.1.1.b.ii	Recording voter selections of candidates and contests into ballot image storage independently from voting data storage	***N/A***
4.1.1.c	For precinct-count voting systems (paper-based and DRE):	***Yes***

Requirement	***Requirement Text***	***Conform***
4.1.1.c.i	Consolidation of vote selection data from multiple precinct-based voting machines to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data	***Yes***
4.1.1.d	For central-count voting systems (paper-based and DRE):	***Yes***
4.1.1.d.i	Consolidation of vote selection data from multiple counting devices to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data	***Yes***
4.1.1.end	For testing purposes, the acceptable error rate is defined using two parameters: the desired error rate to be achieved, and the maximum error rate that should be accepted by the test process. For each processing function indicated above, the voting system shall achieve a target error rate of no more than one in 10,000,000 ballot positions, with a maximum acceptable error rate in the test process of one in 500,000 ballot positions.	***Yes***
4.1.2	Environmental Requirements	***Yes***
4.1.2	The environmental requirements for voting systems include shelter, space, furnishings and fixtures, supplied energy, environmental control, and external telecommunications services. Environmental conditions applicable to the design and operation of voting systems consist of the following categories: Natural environment • Induced environment, including proper and improper operation and handling of the system and its components during the election processes • Transportation and storage • Electromagnetic signal environment, including exposure to and generation of radio frequency energy All voting systems shall be designed to withstand the environmental conditions contained in the appropriate test procedures of the Guidelines. These procedures will be applied to all devices for casting, scanning and counting ballots, except those that constitute COTS devices that have not been modified in any manner to support their use as part of a voting system and that have a documented record of performance under conditions defined in the Guidelines. The Technical Data Package supplied by the vendor shall include a statement of all requirements and restrictions regarding environmental protection, electrical service, recommended auxiliary power, telecommunications service, and any other facility or resource required for the proper installation and operation of the system.	***Yes***
4.1.2.1	Shelter Requirements	***Yes***
4.1.2.1	All precinct count systems shall be designed for storage and operation in any enclosed facility ordinarily used as a warehouse or polling place, with prominent instructions as to any special storage requirements.	***Yes***
4.1.2.2	Space Requirements	***Yes***
4.1.2.2	There is no restriction on space allowed for the installation of voting systems, except that the arrangement of these systems shall not impede performance of their duties by polling place officials, the orderly flow of voters through the polling place or the ability for the voter to vote in private.	***Yes***
4.1.2.3	Furnishings and Fixtures	***Yes***
4.1.2.3	Any furnishings or fixtures provided as a part of voting systems, and any components provided by the vendor that are not a part of the voting system but that are used to support its storage, transportation or operation, shall comply with the safety design of Subsection 4.3.8.	***Yes***
4.1.2.4	Electrical Supply Components of voting systems that require an electrical supply shall meet the following standards:	***Yes***

Requirement	***Requirement Text***	***Conform***
4.1.2.4.a	Precinct count voting systems shall operate with the electrical supply ordinarily found in polling places (Nominal 120 Vac/60Hz/1 phase)	***Yes***
4.1.2.4.b	Central count voting systems shall operate with the electrical supply ordinarily found in central tabulation facilities or computer room facilities (Nominal 120 Vac/60Hz/1, nominal 208 Vac/60Hz/3 or nominal 240 Vac/60Hz/2)	***Yes***
4.1.2.4.c	All voting machines shall also be capable of operating for a period of at least 2 hours on backup power, such that no voting data is lost or corrupted nor normal operations interrupted. When backup power is exhausted the voting machine shall retain the contents of all memories intact. The backup power capability is not required to provide lighting of the voting area.	***Yes***
4.1.2.5	Electrical Power Disturbance Vote scanning and counting equipment for paper-based voting systems, and all DRE voting equipment, shall be able to withstand, without disruption of normal operation or loss of data:	***Yes***
4.1.2.5.a	Voltage dip of 30% of nominal @10 ms;	***Yes***
4.1.2.5.b	Voltage dip of 60% of nominal @100 ms & 1 sec	***Yes***
4.1.2.5.c	Voltage dip of >95% interrupt @5 sec	***Yes***
4.1.2.5.d	Surges of +15% line variations of nominal line voltage	***Yes***
4.1.2.5.e	Electric power increases of 7.5% and reductions of 12.5% of nominal specified power supply for a period of up to four hours at each power level	***Yes***
4.1.2.6	Electrical Fast Transient Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, electrical fast transients of:	***Yes***
4.1.2.6.a	+ 2 kV and - 2 kV on External Power lines (both AC and DC)	***Yes***
4.1.2.6.b	+ 1 kV and - 1 kV on Input/Output lines(signal, data, and control lines) longer than 3 meters	***Yes***
4.1.2.6.c	Repetition Rate for all transient pulses will be 100 kHz	***Yes***
4.1.2.7	Lightning Surge 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:	***Yes***
4.1.2.7.a	+2 kV AC line to line	***Yes***
4.1.2.7.b	+2 kV AC line to earth	***Yes***
4.1.2.7.c	+ or – 0.5 kV DC line to line >10m	***Yes***
4.1.2.7.d	+ or – 0.5 kV DC line to earth >10m	***Yes***
4.1.2.7.e	+1 kV I/O sig/control >30m	***Yes***
4.1.2.8	Electrostatic Disruption	***Yes***

Requirement	***Requirement Text***	***Conform***
4.1.2.8	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.	***Yes***
4.1.2.9	Electromagnetic Emissions	***Yes***
4.1.2.9	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall comply with the Rules and Regulations of the Federal Communications Commission, Part 15; Class B requirements for both radiated and conducted emissions.	***Yes***
4.1.2.10	Electromagnetic Susceptibility	***Yes***
4.1.2.10	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.	***Yes***
4.1.2.11	Conducted RF Immunity 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, conducted RF energy of:	***Yes***
4.1.2.11.a	10V rms over the frequency range 150 KHz to 80 MHz with an 80% amplitude modulation with a 1 KHz sine wave AC & DC power	***Yes***
4.1.2.11.b	10V sig/control >3 m over the frequency range 150 KHz to 80 MHz with an 80% amplitude modulation with a 1 KHz sine wave	***Yes***
4.1.2.12	Magnetic Fields Immunity	***Yes***
4.1.2.12	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, AC magnetic fields of 30 A/m at 60 Hz.	***Yes***
4.1.2.13	Environmental Control – Operating Environment	***Yes***
4.1.2.13	Equipment used for election management activities or vote counting (including both precinct and central count systems) shall be capable of operation in temperatures ranging from 50 to 95 degrees Fahrenheit.	***Yes***
4.1.2.14	Environmental Control – Transit and Storage Equipment used for vote casting or for counting votes in a precinct count system, shall meet these specific minimum performance standards that simulate exposure to physical shock and vibration associated with handling and transportation by surface and air common carriers, and to temperature conditions associated with delivery and storage in an uncontrolled warehouse environment:	***Yes***
4.1.2.14.a	High and low storage temperatures ranging from -4 to +140 degrees Fahrenheit, equivalent to MIL-STD-810D, Methods 501.2 and 502.2, Procedure I-Storage	***Yes***
4.1.2.14.b	Bench handling equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI	***Yes***
4.1.2.14.c	Vibration equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier	***Yes***
4.1.2.14.d	Uncontrolled humidity equivalent to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid	***Yes***
4.1.2.15	Data Network Requirements	***Yes***

Requirement	***Requirement Text***	***Conform***
4.1.2.15	Voting systems may use a local or remote data network. If such a network is used, then all components of the network shall comply with the telecommunications requirements described in Section 6 and the Security requirements described in Section 7.	***Yes***
4.1.3	Election Management System (EMS) Requirements The Election Management System (EMS) requirements address electronic hardware and software used to conduct the prevoting functions defined in Section 2 with regard to ballot preparation, election programming, ballot and program installation, readiness testing, verification at the polling place, and verification at the central location.	***Yes***
4.1.3.1	Recording Requirements Voting systems shall accurately record all election management data entered by the user, including election officials or their designees. For recording accuracy, all systems shall:	***Yes***
4.1.3.1.a	Record every entry made by the user	***Yes***
4.1.3.1.b	Add permissible voter selections correctly to the memory components of the device	***Yes***
4.1.3.1.c	Verify the correctness of detection of the user selections and the addition of the selections correctly to memory	***Yes***
4.1.3.1.d	Add various forms of data entered directly by the election official or designee, such as text, line art, logos, and images	***Yes***
4.1.3.1.e	Verify the correctness of detection of data entered directly by the user and the addition of the selections correctly to memory	***Yes***
4.1.3.1.f	Preserve the integrity of election management data stored in memory against corruption by stray electromagnetic emissions, and internally generated spurious electrical signals	***Yes***
4.1.3.1.g	Log corrected data errors by the voting system	***Yes***
4.1.3.2	Memory Stability	***Yes***
4.1.3.2	Memory devices used to retain election management data shall have demonstrated error-free data retention for a period of 22 months.	***Yes***
4.1.4	Vote Recording Requirements The vote recording requirements address the enclosure, equipment, and supplies used by voters to vote.	***Yes***
4.1.4.1	Common Requirements All voting systems shall provide voting booths or enclosures for poll site use. Such booths or enclosures may be integral to the voting system or supplied as components of the voting system, and shall:	***Yes***
4.1.4.1.a	Be integral to, or make provision for, the installation of the voting machine	***Yes***
4.1.4.1.b	Ensure by its structure stability against movement or overturning during entry, occupancy, and exit by the voter	***Yes***
4.1.4.1.c	Provide privacy for the voter, and be designed in such a way as to prevent observation of the ballot by any person other than the voter	***Yes***
4.1.4.1.d	Be capable of meeting the accessibility requirements of Subsection 3.2	***Yes***
4.1.4.2	Paper-based Recording Requirements The paper-based recording requirements govern: Ballot cards or sheets	***Yes***
4.1.4.2.a	Paper ballots used by paper-based voting systems shall meet the following standards:	***Yes***
4.1.4.2.a.i	Marks that identify the unique ballot format shall be outside the area in which votes are recorded, so as to minimize the likelihood that these marks will be mistaken for vote responses and the likelihood that recorded votes will obliterate these marks	***Yes***

Requirement	*Requirement Text*	*Conform*
4.1.4.2.a.ii	If printed alignment marks are used to locate the vote response fields on the ballot, these marks shall be outside the area in which votes are recorded, so as to minimize the likelihood that these marks will be mistaken for vote responses and the likelihood that recorded votes will obliterate these marks	***Yes***
4.1.4.2.a.iii	The Technical Data Package shall specify the required paper stock, size, shape, opacity, color, watermarks, field layout, orientation, size and style of printing, size and location of mark fields used for vote response fields and to identify unique ballot formats, placement of alignment marks, ink for printing, and folding and bleed-through limitations for preparation of ballots that are compatible with the system	***Yes***
4.1.4.2.b	Marking Devices The Technical Data Package shall specify marking devices, which, if used to make the prescribed form of mark, produce readable marked ballots such that the system meets the performance requirements for accuracy in Subsection 4.1.1. Marking devices can be either manual (such as pens or pencils) or electronic. These specifications shall identify:	***Yes***
4.1.4.2.b.i	Specific characteristics of marking devices that affect readability of marked ballots	***Yes***
4.1.4.2.b.ii	Performance capabilities with regard to each characteristic	***Yes***
4.1.4.2.b.iii	For marking devices manufactured by multiple external sources, a listing of sources and model numbers that are compatible with the system	***Yes***
4.1.4.2.c	Frames or Fixtures for Printed Ballots A frame or fixture for printed ballot cards is optional. However, if such a device is provided, it shall:	***N/A***
4.1.4.2.c.i	Be of any size and shape consistent with its intended use	***N/A***
4.1.4.2.c.ii	Position the card properly	***N/A***
4.1.4.2.c.iii	Hold the ballot card securely in its proper location and orientation for voting	***N/A***
4.1.4.2.c.iv	Comply with the requirements for design and construction contained in Subsection 4.3	***N/A***
4.1.4.2.d.	Ballot Boxes and Ballot Transfer Boxes Ballot boxes and ballot transfer boxes, which serve as secure containers for the storage and transportation of voted ballots, shall:	***Yes***
4.1.4.2.d.i	Be of any size, shape, and weight commensurate with their intended use	***Yes***
4.1.4.2.d.ii	Incorporate locks or seals, the specifications of which are described in the system documentation	***Yes***
4.1.4.2.d.iii	Provide specific points where ballots are inserted, with all other points on the box constructed in a manner that prevents ballot insertion	***Yes***
4.1.4.2.d.iv	For precinct count systems, contain separate compartments for the segregation of unread ballots, ballots containing write-in votes or any irregularities that may require special handling or processing. In lieu of compartments, the conversion processing may mark such ballots with an identifying spot or stripe to facilitate manual segregation	***Yes***
4.1.4.3	DRE System Recording Requirements The DRE system recording requirements address the detection and recording of votes, including the logic and data processing functions required to determine the validity of voter selections, to accept and record valid selections, and to reject invalid selections. The requirements also address the physical environment in which ballots are cast.	***N/A***
4.1.4.3.a	Activity Indicator DRE systems shall include an audible or visible activity indicator providing the status of each voting device. This indicator shall:	***N/A***
4.1.4.3.a.i	Indicate whether the device has been activated for voting	***N/A***
4.1.4.3.a.ii	Indicate whether the device is in use	***N/A***
4.1.4.3.b	Vote Recording Accuracy and Integrity To ensure vote recording accuracy and integrity while protecting the anonymity of the voter, all DRE systems shall:	***N/A***

Requirement	***Requirement Text***	***Conform***
4.1.4.3.b.i	Contain all mechanical, electromechanical, and electronic components; software; and controls required to detect and record the activation of selections made by the voter in the process of voting and casting a ballot	***N/A***
4.1.4.3.b.ii	Incorporate redundant memories to detect and allow correction of errors caused by the failure of any of the individual memories	***N/A***
4.1.4.3.b.iii	Provide at least two processes that record the voter's selections that: To the extent possible	***N/A***
4.1.4.3.b.iv	Use a different process to store ballot images, for which the method of recording may include any appropriate encoding or data compression procedure consistent with the regeneration of an unequivocal record of the ballot as cast by the voter	***N/A***
4.1.4.3.b.v	Provide a capability to retrieve ballot images in a form readable by humans	***N/A***
4.1.4.3.b.vi	Ensure that all processing and storage protects the anonymity of the voter	***N/A***
4.1.4.3.c	Recording Accuracy DRE systems shall meet the following requirements for recording accurately each vote and ballot cast:	***N/A***
4.1.4.3.c.i	Detect every selection made by the voter	***N/A***
4.1.4.3.c.ii	Correctly add permissible selections to the memory components of the device	***N/A***
4.1.4.3.c.iii	Verify the correctness of the detection of the voter selections and the addition of the selections to memory	***N/A***
4.1.4.3.c.iv	Achieve an error rate not to exceed the requirement indicated in Subsection 4.1.1	***N/A***
4.1.4.3.c.v	Preserve the integrity of voting data and ballot images (for DRE machines) stored in memory for the official vote count and audit trail purposes against corruption by stray electromagnetic emissions, and internally generated spurious electrical signals	***N/A***
4.1.4.3.c.vi	Maintain a log of corrected data	***N/A***
4.1.4.3.end	Recording reliability refers to the ability of the DRE system to record votes accurately at its maximum rated processing volume for a specified period of time. The DRE system shall record votes reliably in accordance with the requirements of Subsection 4.3.3.	***N/A***
4.1.5	Paper-based Conversion Requirements The paper-based conversion requirements address the ability of the system to read the ballot card and to translate its pattern of marks into electronic signals for later processing. These capabilities may be built into the voting system in an integrated fashion, or may be provided by one or more components that are not unique to the system, such as a general purpose data processing card reader or read head suitably interfaced to the system. These requirements address two major functions: ballot handling and ballot reading.	***Yes***
4.1.5	Ballot Handling Ballot handling consists of a ballot card's acceptance, movement through the read station, and transfer into a collection station or receptacle.	***Yes***
4.1.5.1.a	The capacity to convert the marks on individual ballots into signals is uniquely important to central count systems. The capacity for a central count system shall be documented by the vendor. This documentation shall include the capacity for individual components that impact the overall capacity	***Yes***
4.1.5.1.b	Unreadable Ballots (Central Count Paper-based) When ballots are unreadable or some condition is detected requiring that the cards be segregated from normally processed ballots for human review (e.g. write-ins), all central count paper-based systems shall do one of the following:	***Yes***
4.1.5.1.b.i	Outstack the ballot	***Yes***
4.1.5.1.b.ii	Stop the ballot reader and display a message prompting the election official or designee to remove the ballot	***Yes***
4.1.5.1.b.iii	Mark the ballot with an identifying mark to facilitate its later identification	***N/A***

Requirement	*Requirement Text*	*Conform*
4.1.5.1.c	Additionally, the system shall provide a capability that can be activated by an authorized election official to identify ballots containing overvotes, blank ballots, and ballots containing undervotes in a designated contest. If enabled, these capabilities shall perform one of the above actions in response to the indicated condition.	*Yes*
4.1.5.1.d	Unreadable Ballots (Precinct Count) When ballots are unreadable or when some condition is detected requiring that the cards be segregated from normally processed ballots for human review (e.g. write-in votes) all precinct count systems shall:	*Yes*
4.1.5.1.d.i	In response to an unreadable or blank ballot, return the ballot and provide a message prompting the voter to examine the ballot	*Yes*
4.1.5.1.d.ii	In response to a ballot with a write-in vote, segregate the ballot or mark the ballot with an identifying mark to facilitate its later identification	*Yes*
4.1.5.1.d.iii	In response to a ballot with an overvote the system shall: Provide a capability to identify an overvoted ballot " Return the ballot " Provide an indication prompting the voter to examine the ballot " Allow the voter to correct the ballot " Provide a means for an authorized election official to deactivate this capability entirely and by contest "	*Yes*
4.1.5.1.d.iv	In response to a ballot with an undervote, the system shall: Provide a capability to identify an undervoted ballot " Return the ballot " Provide an indication prompting the voter to examine the ballot " Allow the voter to correct the ballot " Allow the voter to submit the ballot with the undervote " Provide a means for an authorized election official to deactivate this capability "	*Yes*
4.1.5.1.e	Ballot readers shall prevent multiple feed or detect and provide an alarm indicating multiple feed. Multiple feed occurs when a ballot reader attempts to read more than one ballot at a time.	*Yes*
4.1.5.1.e.i	If multiple feed is detected, the card reader shall halt in a manner that permits the operator to remove the unread cards causing the error, and reinsert them in the card input hopper	*Yes*
4.1.5.1.e.ii	The frequency of multiple feeds with ballots intended for use with the system shall not exceed I in 10,000	*Yes*
4.1.5.2	Ballot Reading Accuracy This paper-based system requirement governs the conversion of the physical ballot into electronic data. Reading accuracy for ballot conversion refers to the ability to:	*Yes*
4.1.5.2.a	Recognize vote punches or marks, or the absence thereof, for each possible selection on the ballot	*Yes*
4.1.5.2.b	Discriminate between valid punches or marks and extraneous perforations, smudges, and folds	*Yes*
4.1.5.2.c	Convert the vote punches or marks, or the absence thereof, for each possible selection on the ballot into digital signals	*Yes*
4.1.5.2.d	To ensure accuracy, paper-based systems shall: Detect punches or marks that conform to vendor specifications with an error rate not exceeding the requirement indicated in Subsection 4.1.1	*Yes*
4.1.5.2.e	To ensure accuracy, paper-based systems shall: Ignore, and not record, extraneous perforations, smudges, and folds	*Yes*
4.1.5.2.f	To ensure accuracy, paper-based systems shall: Reject ballots that meet all vendor specifications at a rate not to exceed 2 percent	*Yes*
4.1.6	Tabulation Processing Requirements Tabulation processing requirements apply to the hardware and software required to accumulate voting data for all candidates and measures within voting machines and polling places, and to consolidate the voting data at a central level or multiple levels. These requirements also address the generation and maintenance of audit records, the detection and disabling of improper use or operation of the system, and the monitoring of overall system status. Separate and distinct requirements for paper-based and DRE voting systems are presented below.	*Yes*

Requirement	***Requirement Text***	***Conform***
4.1.6.1	Paper Based Processing Requirements The paper-based processing requirements address all mechanical devices, electromechanical devices, electronic devices, and software required to perform the logical and numerical functions of interpreting the electronic image of the voted ballot, and assigning votes to the proper memory registers.	***Yes***
4.1.6.1.a	Processing Accuracy Processing accuracy refers to the ability of the system to receive electronic signals produced by punches for punchcard systems and vote marks and timing information for marksense systems; perform logical and numerical operations upon these data; and reproduce the contents of memory when required, without error. Specific requirements are detailed below:	***Yes***
4.1.6.1.a.i	Processing accuracy shall be measured by vote selection error rate, the ratio of uncorrected vote selection errors to the total number of ballot positions that could be recorded across all ballots when the system is operated at its nominal or design rate of processing	***Yes***
4.1.6.1.a.ii	The vote selection error rate shall include data that denotes ballot style or precinct as well as data denoting a vote in a specific contest or ballot proposition	***Yes***
4.1.6.1.a.iii	The vote selection error rate shall include all errors from any source	***Yes***
4.1.6.1.a.iv	The vote selection error rate shall not exceed the requirement indicated in Subsection 4.1.1	***Yes***
	Paper-based Devices	***Yes***
4.1.6.1.b	Paper-based system memory devices, used to retain control programs and data, shall have demonstrated error-free data retention for a period of 22 months, under the environmental conditions for operation and non-operation (i.e., storage).	***Yes***
4.1.6.2	DRE Voting Systems The DRE voting systems processing requirements address all mechanical devices, electromechanical devices, electronic devices, and software required to process voting data after the polls are closed.	***N/A***
4.1.6.2.a.	Processing Speed DRE voting systems shall meet the following requirements for processing speed:	***N/A***
4.1.6.2.a.i	Operate at a speed sufficient to respond to any operator and voter input without perceptible delay (no more than three seconds)	***N/A***
4.1.6.2.a.ii	If the consolidation of polling place data is done locally, perform this consolidation in a time not to exceed five minutes for each device in the polling place	***N/A***
4.1.6.2.b	Processing Accuracy Processing accuracy is defined as the ability of the system to process voting data stored in DRE voting devices or in removable memory modules installed in such devices. Processing includes all operations to consolidate voting data after the polls have been closed. DRE voting systems shall:	***N/A***
4.1.6.2.b.i	Produce reports that are completely consistent, with no discrepancy among reports of voting device data produced at any level	***N/A***
4.1.6.2.b.ii	Produce consolidated reports containing absentee, provisional or other voting data that are similarly error-free. Any discrepancy, regardless of source, is resolvable to a procedural error, to the failure of a non-memory device or to an external cause	***N/A***
4.1.6.2.c	Memory Stability	***N/A***
4.1.6.2.c	DRE system memory devices used to retain control programs and data shall have demonstrated error-free data retention for a period of 22 months. Error-free retention may be achieved by the use of redundant memory elements, provided that the capability for conflict resolution or correction among elements is included.	***N/A***
4.1.7	Reporting Requirements The reporting requirements govern all mechanical, electromechanical, and electronic devices required for voting systems to print audit record entries and results of the tabulation. These requirements also address data storage media for transportation of data to other sites.	***Yes***
4.1.7.1	Removable Storage Media	***Yes***

Requirement	***Requirement Text***	***Conform***
4.1.7.1	In voting systems that use storage media that can be removed from the system and transported to another location for readout and report generation, these media shall use devices with demonstrated error-free retention for a period of 22 months under the environmental conditions for operation and non-operation contained in Subsection 4.1.2. Examples of removable storage media include: programmable read-only memory (PROM), random access memory (RAM) with battery backup, magnetic media or optical media.	***Yes***
4.1.7.2	Printers All printers used to produce reports of the vote count shall be capable of producing:	***Yes***
4.1.7.2.a	Alphanumeric headers	***Yes***
4.1.7.2.b	Election, office and issue labels	***Yes***
4.1.7.2.c	Alphanumeric entries generated as part of the audit record	***Yes***
4.1.8	Vote Data Management Requirements The vote data management requirements for all systems address capabilities that manage, process, and report voting data after the data has been consolidated at the polling place or other jurisdictional levels. These capabilities allow the system to: Consolidate voting data from polling place data memory or transfer devices " Report polling place summaries " Process absentee ballots	***Yes***
4.1.8.1	Data File Management All voting systems shall provide the capability to:	***Yes***
4.1.8.1.a	Integrate voting data files with ballot definition files	***Yes***
4.1.8.1.b	Verify file compatibility	***Yes***
4.1.8.1.c	Edit and update files as required	***Yes***
4.1.8.2	Data Report Generation	***Yes***
4.1.8.2	All voting systems shall include report generators for producing output reports at the device, polling place, and summary level, with provisions for administrative and judicial subdivisions as required by the using jurisdiction.	***Yes***
4.2	Physical Characteristics This subsection covers physical characteristics of all voting systems and components that affect their general utility and suitability for election operations.	***Yes***
4.2.1	Size	***Yes***
4.2.1	There is no numerical limitation on the size of any voting equipment, but the size of each voting machine should be compatible with its intended use and the location at which the equipment is to be used.	***Yes***
4.2.2	Weight	***Yes***
4.2.2	There is no numerical limitation on the weight of any voting equipment, but the weight of each voting machine should be compatible with its intended use and the location at which the equipment is to be used.	***Yes***
4.2.3	Transport and Storage of Precinct Systems: All precienct voting systems shall:	***Yes***
4.2.3.a	Provide a means to safely and easily handle, transport, and install voting equipment, such as wheels or a handle or handles	***Yes***

Requirement	***Requirement Text***	***Conform***
4.2.3.b.i	Be capable of using, or be provided with, a protective enclosure rendering the equipment capable of withstanding: Impact, shock and vibration loads associated with surface and air transportation	***Yes***
4.2.3.b.ii	Be capable of using, or be provided with, a protective enclosure rendering the equipment capable of withstanding: Stacking loads associated with storage	***Yes***
4.3	Design, Construction, and Maintenance Characteristics This subsection covers voting system materials, construction workmanship, and specific design characteristics important to the successful operation and efficient maintenance of the voting system.	***Yes***
4.3.1	Materials, Processes, and Parts The approach to system design is unrestricted, and may incorporate any form or variant of technology capable of meeting the voting systems requirements and standards.	***Yes***
4.3.1	Precinct count systems shall be designed in accordance with best commercial practice for microcomputers, process controllers, and their peripheral components. Central count voting systems and equipment used in a central tabulating environment shall be designed in accordance with best commercial and industrial practice.	***Yes***
4.3.1	All voting systems shall:	***Yes***
4.3.1.a	Be designed and constructed so that the frequency of equipment malfunctions and maintenance requirements are reduced to the lowest level consistent with cost constraints	***Yes***
4.3.1.b	Include, as part of the accompanying Technical Data Package, an approved parts list	***Yes***
4.3.1.c	Exclude parts or components not included in the approved parts list	***Yes***
4.3.2	Durability	***Yes***
4.3.2	All voting systems shall be designed to withstand normal use without deterioration and without excessive maintenance cost for a period of ten years.	***Yes***
4.3.3	Reliability	***Yes***
4.3.3	The reliability of voting system devices shall be measured as Mean Time Between Failure (MTBF) for the system submitted for testing. MBTF is defined as the value of the ratio of operating time to the number of failures which have occurred in the specified time interval. A typical system operations scenario consists of approximately 45 hours of equipment operation, consisting of 30 hours of equipment set-up and readiness testing and 15 hours of elections operations. For the purpose of demonstrating compliance with this requirement, a failure is defined as any event which results in either the: Loss of one or more functions " • Degradation of performance such that the device is unable to perform its intended function for longer than 10 seconds	***Yes***
4.3.3	The MTBF demonstrated during certification testing shall be at least 163 hours.	***Yes***

Requirement	***Requirement Text***	***Conform***
4.3.4	Maintainability Maintainability represents the ease with which 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. Maintainability includes the ability of equipment and software to self-diagnose problems and make non-technical election workers aware of a problem. Maintainability addresses all scheduled and unscheduled events, which are performed to: ? Determine the operational status of the system or a component ? Adjust, align, tune or service components ? Repair or replace a component having a specified operating life or replacement interval ? Repair or replace a component that exhibits an undesirable predetermined physical condition or performance degradation ? Repair or replace a component that has failed ? Verify the restoration of a component or the system to operational status	***Yes***
4.3.4	Maintainability shall be determined based on the presence of specific physical attributes that aid system maintenance activities, and the ease with which system maintenance tasks can be performed by the test lab. Although a more quantitative basis for assessing maintainability, such as the Mean Time to Repair the system is desirable, the certification of a system is conducted before it is approved for sale and thus before a broader base of maintenance experience can be obtained.	***Yes***
4.3.4.1	Physical Attributes The following physical attributes will be examined to assess reliability:	***Yes***
4.3.4.1.a	Presence of labels and the identification of test points	***Yes***
4.3.4.1.b	Provision of built-in test and diagnostic circuitry or physical indicators of condition	***Yes***
4.3.4.1.c	Presence of labels and alarms related to failures	***Yes***
4.3.4.1.d	Presence of features that allow non-technicians to perform routine maintenance tasks (such as update of the system database)	***Yes***
4.3.4.2	Additional Attributes The following additional attributes will be considered to assess system maintainability:	***Yes***
4.3.4.2.a	Ease of detecting that equipment has failed by a non-technician	***Yes***
4.3.4.2.b	Ease of diagnosing problems by a trained technician	***Yes***
4.3.4.2.c	Low false alarm rates (i.e., indications of problems that do not exist)	***Yes***
4.3.4.2.d	Ease of access to components for replacement	***Yes***
4.3.4.2.e	Ease with which adjustment and alignment can be performed	***Yes***
4.3.4.2.f	Ease with which database updates can be performed by a non-technician	***Yes***
4.3.4.2.g	Adjust, align, tune or service components	***Yes***
4.3.5	Availability The availability of a voting system is defined as the probability that the equipment (and supporting software) needed to perform designated voting functions will respond to operational commands and accomplish the function. The voting system shall meet the availability standard for each of the following voting functions:	***Yes***
4.3.5.a.	For all paper-based systems:	***Yes***
4.3.5.a.i	Recording voter selections (such as by ballot marking or punch)	***Yes***

Requirement	***Requirement Text***	***Conform***
4.3.5.a.ii	Scanning the punches or marks on paper ballots and converting them into digital data	***Yes***
4.3.5.b	For all DRE systems, recording and storing voter ballot selections	***N/A***
4.3.5.c	For precinct count systems (paper-based and DRE), consolidation of vote selection data from multiple precinct based systems to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data	***Yes***
4.3.5.d	For central-count systems (paper-based and DRE), consolidation of vote selection data from multiple counting devices to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data	***Yes***
4.3.5	System availability is measured as the ratio of the time during which the system is operational (up time) to the total time period of operation (up time plus down time). Inherent availability (Ai) is the fraction of time a system is functional, based upon Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR), that is: Ai = (MTBF)/(MTBF + MTTR) MTTR is the average time required to perform a corrective maintenance task during periods of system operation. Corrective maintenance task time is active repair time, plus the time attributable to other factors that could lead to logistic or administrative delays, such as travel notification of qualified maintenance personnel and travel time for such personnel to arrive at the appropriate site. Corrective maintenance may consist of substitution of the complete device or one of its components, as in the case of precinct count and some central count systems, or it may consist of on-site repair. The voting system shall achieve at least 99 percent availability during normal operation for the functions indicated above. This standard encompasses for each function the combination of all devices and components that support the function, including their MTTR and MTBF attributes.	***Yes***
4.3.5	Vendors shall specify the typical system configuration that is to be used to assess availability, and any assumptions made with regard to any parameters that impact the MTTR. These factors shall include at a minimum:	***Yes***
4.3.5.e	Recommended number and locations of spare devices or components to be kept on hand for repair purposes during periods of system operation	***Yes***
4.3.5.f	Recommended number and locations of qualified maintenance personnel who need to be available to support repair calls during system operation	***Yes***
4.3.5.g	Organizational affiliation (i.e., jurisdiction, vendor) of qualified maintenance personnel	***Yes***
4.3.6	Product Marking All voting systems shall:	***Yes***
4.3.6.a	Identify all devices by means of a permanently affixed nameplate or label containing the name of the manufacturer or vendor, the name of the device, its part or model number, its revision letter, its serial number, and if applicable, its power requirements	***Yes***
4.3.6.b	Display on each device a separate data plate containing a schedule for and list of operations required to service or to perform preventive maintenance	***Yes***
4.3.6.c	Display advisory caution and warning instructions to ensure safe operation of the equipment and to avoid exposure to hazardous electrical voltages and moving parts at all locations where operation or exposure may occur	***Yes***
4.3.7	Workmanship To help ensure proper workmanship, all manufacturers of voting systems shall:	***Yes***
4.3.7.a	Adopt and adhere to practices and procedures to ensure that their products are free from damage or defect that could make them unsatisfactory for their intended purpose	***Yes***
4.3.7.b	Ensure that components provided by external suppliers are free from damage or defect that could make them unsatisfactory for their intended purpose	***Yes***
4.3.8	Safety All voting systems shall meet the following requirements for safety:	***Yes***

Requirement	***Requirement Text***	***Conform***
4.3.8.a	All voting systems and their components shall be designed to eliminate hazards to personnel or to the equipment itself	***Yes***
4.3.8.b	Defects in design and construction that can result in personal injury or equipment damage must be detected and corrected before voting systems and components are placed into service	***Yes***
4.3.8.c	Equipment design for personnel safety shall be equal to or better than the appropriate requirements of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Part 1910	***Yes***
5	Software Requirements The requirements of this section are intended to ensure that voting system software is reliable, robust, testable, and maintainable. The requirements in this section also support system accuracy, logical correctness, privacy, security and integrity. The general requirements of this section apply to software used to support the entire range of voting system activities described in Section 2.	***Yes***
5.3	Data and Document Retention All systems shall:	***Yes***
5.3.a	Maintain the integrity of voting and audit data during an election, and for at least 22 months thereafter, a time sufficient to resolve most contested elections and support other activities related to the reconstruction and investigation of a contested election	***Yes***
5.3.b	Protect against the failure of any data input or storage device at a location controlled by the jurisdiction or its contractors, and against any attempt at improper data entry or retrieval	***Yes***
5.4	Audit Record Data	***Yes***
5.4	Audit trails are essential to ensure the integrity of a voting system. Operational requirements for audit trails are described in Subsection 2.5.1.1. Audit record data are generated by these procedures. The audit record data in the following subsections are essential to the complete recording of election operations and reporting of the vote tally. This list of audit records may not reflect the design constructs of some systems. Therefore, vendors shall supplement it with information relevant to the operation of their specific systems.	***Yes***
5.4.1	Pre-election Audit Records	***Yes***
5.4.1	During election definition and ballot preparation, the system shall audit the preparation of the baseline ballot formats and modifications to them, a description of these modifications, and corresponding dates. The log shall include:	***Yes***
5.4.1.a	The allowable number of selections a contest	***Yes***
5.4.1.b	The combinations of voting patterns permitted or required by the jurisdiction	***Yes***
5.4.1.c	The inclusion or exclusion of contests as the result of multiple districting within the polling place	***Yes***
5.4.1.d	Any other characteristics that may be peculiar to the jurisdiction, the election or the polling place location	***Yes***
5.4.1.e	Manual data maintained by election personnel	***Yes***
5.4.1.f	Samples of all final ballot formats	***Yes***
5.4.1.g	Ballot preparation edit listings	***Yes***
5.4.2	System Readiness Audit Records The following minimum requirements apply to system readiness audit records:	***Yes***

Requirement	***Requirement Text***	***Conform***
5.4.2.a	Prior to the start of ballot counting, a system process shall verify hardware and software status and generate a readiness audit record. This record shall include the identification of the software release, the identification of the election to be processed, and the results of software and hardware diagnostic tests	***Yes***
5.4.2.b	In the case of systems used at the polling place, the record shall include polling place identification	***Yes***
5.4.2.c	The ballot interpretation logic shall test and record the correct installation of ballot formats on voting devices	***Yes***
5.4.2.d	The software shall check and record the status of all data paths and memory locations to be used in vote recording to protect against contamination of voting data	***Yes***
5.4.2.e	Upon the conclusion of the tests, the software shall provide evidence in the audit record that the test data have been expunged	***Yes***
5.4.2.f	If required and provided, the ballot reader and arithmetic-logic unit shall be evaluated for accuracy, and the system shall record the results. It shall allow the processing or simulated processing of sufficient test ballots to provide a statistical estimate of processing accuracy	***Yes***
5.4.2.g	For systems that use a public network, provide a report of test ballots that includes:	***N/A***
5.4.2.g.i	Number of ballots sent	***N/A***
5.4.2.g.ii	When each ballot was sent	***N/A***
5.4.2.g.iii	Machine from which each ballot was sent	***N/A***
5.4.2.g.iv	Specific votes or selections contained in the ballot	***N/A***
5.4.3	In-Process Audit Records In-process audit records document system operations during diagnostic routines and the casting and tallying of ballots. At a minimum, the in-process audit records shall contain:	***Yes***
5.4.3.a	Machine generated error and exception messages to demonstrate successful recovery. Examples include, but are not necessarily limited to:	***Yes***
5.4.3.a.i	The source and disposition of system interrupts resulting in entry into exception handling routines	***Yes***
5.4.3.a.ii	All messages generated by exception handlers	***Yes***
5.4.3.a.iii	The identification code and number of occurrences for each hardware and software error or failure	***Yes***
5.4.3.a.iv	Notification of system login or access errors, file access errors, and physical violations of security as they occur, and a summary record of these events after processing	***Yes***
5.4.3.a.v	Other exception events such as power failures, failure of critical hardware components, data transmission errors or other types of operating anomalies	***Yes***
5.4.3.b	Critical system status messages other than informational messages displayed by the system during the course of normal operations. These items include, but are not limited to:	***Yes***
5.4.3.b.i	Diagnostic and status messages upon startup	***Yes***
5.4.3.b.ii	The "zero totals" check conducted before opening the polling place or counting a precinct centrally	***Yes***
5.4.3.b.iii	For paper-based systems, the initiation or termination of card reader and communications equipment operation	***Yes***
5.4.3.b.iv	For DRE machines at controlled voting locations, the event (and time, if available) of activating and casting each ballot (i.e., each voter's transaction as an event). This data can be compared with the public counter for reconciliation purposes	***N/A***
5.4.3.c	Non-critical status messages that are generated by the machine's data quality monitor or by software and hardware condition monitors	***Yes***

Requirement	***Requirement Text***	***Conform***
5.4.3.d	System generated log of all normal process activity and system events that require operator intervention, so that each operator access can be monitored and access sequence can be constructed	***Yes***
5.4.4	Vote Tally Data In addition to the audit requirements described above, other election-related data is essential for reporting results to interested parties, the press, and the voting public, and is vital to verifying an accurate count.	***Yes***
5.4.4	Voting systems shall meet these reporting requirements by providing software capable of obtaining data concerning various aspects of vote counting and producing printed reports. At a minimum, vote tally data shall include:	***Yes***
5.4.4.a	Number of ballots cast, using each ballot configuration, by tabulator, by precinct, and by political subdivision	***Yes***
5.4.4.b	Candidate and measure vote totals for each contest, by tabulator	***Yes***
5.4.4.c	The number of ballots read within each precinct and for additional jurisdictional levels, by configuration, including separate totals for each party in primary elections	***Yes***
5.4.4.d	Separate accumulation of overvotes and undervotes for each contest, by tabulator, precinct and for additional jurisdictional levels (no overvotes would be indicated for DRE voting devices)	***Yes***
5.4.4.e	For paper-based systems only, the total number of ballots both able to be processed and unable to be processed; and if there are multiple card ballots, the total number of cards read	***Yes***
5.4.4.end	For systems that produce an electronic file containing vote tally data, the contents of the file shall include the same minimum data cited above for printed vote tally reports.	***Yes***
5.5	Voter Secrecy (DRE Systems) All DRE systems shall ensure vote secrecy by:	***N/A***
5.5.a	Immediately after the voter chooses to cast his or her ballot, record the voter's selections in the memory to be used for vote counting and audit data (including ballot images), and erase the selections from the display, memory, and all other storage, including all forms of temporary storage	***N/A***
5.5.b	Immediately after the voter chooses to cancel his or her ballot, erase the selections from the display and all other storage, including buffers and other temporary storage	***N/A***
6	Telecommunications Requirements	***N/A***
6.1.2	Telecommunications Operations and Providers This section applies to voting-related transmissions over public networks, such as those provided by local distribution and long distance carriers. This section also applies to private networks regardless of whether the network is owned and operated by the election jurisdiction. For systems that transmit official data over public networks, this section applies to telecommunications components installed and operated at locations supervised by election officials, such as polling places or central offices. This includes: Components acquired by the jurisdiction for the purpose of voting	***N/A***
6.1.3	Data Transmissions	***N/A***

Requirement	***Requirement Text***	***Conform***
6.1.3	These requirements apply to the use of telecommunications to transmit data for the preparation of the system for an election, the execution of an election, and the preservation of the system data and audit trails during and following an election. While this section does not assume a specific model of voting system operations and does not assume a specific model for the use of telecommunications to support such operations, it does address the following types of data, where applicable: Voter Authentication: Coded information that confirms the identity of a voter for security purposes for a system that transmits votes individually over a public network Ballot Definition: Information that describes to a voting machine the content and appearance of the ballots to be used in an election Vote Transmission: For systems that transmit votes individually over a public network, the transmission of a single vote within a network at a polling place and to the county (or contractor) for consolidation with other county vote data Vote Count: Information representing the tabulation of votes at any level within the control of the jurisdiction, such as the polling place, precinct or central count List of Voters: A listing of the individual voters who have cast ballots in a specific election Additional data transmissions used to operate a voting system in the conduct of an election, but not explicitly listed above, are also subject to the requirements of this section. For systems that transmit data using public networks, this section applies to telecommunications hardware and software for transmissions within and among all combinations of senders and receivers located at polling places, precinct count facilities and central count facilities (whether operated by the jurisdiction or a contractor).	***N/A***
6.2	Design, Construction, and Maintenance Requirements Design, construction, and maintenance requirements for telecommunications represent the operational capability of both system hardware and software. These capabilities shall be considered basic to all data transmissions.	***N/A***
6.2.1	Accuracy	***N/A***
6.2.1	The telecommunications components of all voting systems shall meet the accuracy requirements of Subsection 4.1.1.	***N/A***
6.2.2	Durability	***N/A***
6.2.2	The telecommunications components of all voting systems shall meet the durability requirements of Subsection 4.3.2.	***N/A***
6.2.3	Reliability	***N/A***
6.2.3	The telecommunications components of all voting systems shall meet the reliability requirements of Subsection 4.3.3.	***N/A***
6.2.4	Maintainability	***N/A***
6.2.4	The telecommunications components of all voting systems shall meet the maintainability requirements of Subsection 4.3.4.	***N/A***
6.2.5	Availability	***N/A***
6.2.5	The telecommunications components of all voting systems shall meet the availability requirements of Subsection 4.3.5.	***N/A***
6.2.6	Integrity For WANs using public telecommunications, boundary definition and implementation shall meet the requirements below.	***N/A***
6.2.6.a	Outside service providers and subscribers of such providers shall not be given direct access or control of any resource inside the boundary.	***N/A***
6.2.6.b	Voting system administrators shall not require any type of control of resources outside this boundary. Typically, an end point of a telecommunications circuit will be a subscriber termination on a Digital Service Unit/Customer Service Unit although the specific technology configuration may vary. Regardless of the technology used, the boundary point must ensure that everything on the voting system side is locally configured and controlled by the election jurisdiction while everything on the public network side is controlled by an outside service provider.	***N/A***

Requirement	***Requirement Text***	***Conform***
6.2.6.c	The system shall be designed and configured such that it is not vulnerable to a single point of failure in the connection to the public network which could cause total loss of voting capabilities at any polling place.	***N/A***
6.2.7	Confirmation	***N/A***
6.2.7	Confirmation occurs when the system notifies the user of the successful or unsuccessful completion of the data transmission, where successful completion is defined as accurate receipt of the transmitted data. To provide confirmation, the telecommunications components of a voting system shall notify the user of the successful or unsuccessful completion of the data transmission. In the event of unsuccessful transmission the user shall be notified of the action to be taken.	***N/A***
7	Security Requirements	***Yes***
7.2	Access Control	***Yes***
7.2.1	General Access Control Policy The vendor shall specify the general features and capabilities of the access control policy recommended to provide effective voting system security. Although the jurisdiction in which the voting system is operated is responsible for determining the access policies for each election, the vendor shall provide a description of recommended policies for:	***Yes***
7.2.1.a	Software access controls	***Yes***
7.2.1.b	Hardware access controls	***Yes***
7.2.1.c	Communications	***Yes***
7.2.1.d	Effective password management	***Yes***
7.2.1.e	Protection abilities of a particular operating system	***Yes***
7.2.1.f	General characteristics of supervisory access privileges	***Yes***
7.2.1.g	Segregation of duties	***Yes***
7.2.1.h	Any additional relevant characteristics	***Yes***
7.2.1.1	Individual Access Privileges Voting system vendors shall:	***Yes***
7.2.1.1.a	Identify each person to whom access is granted, and the specific functions and data to which each person holds authorized access	***Yes***
7.2.1.1.b	Specify whether an individual's authorization is limited to a specific time, time interval or phase of the voting or counting operations	***Yes***
7.2.1.1.c	Permit the voter to cast a ballot expeditiously, but preclude voter access to all aspects of the vote counting processes	***Yes***
7.2.1.2	Access Control Measures Vendors shall provide a detailed description of all system access control measures designed to permit authorized access to the system and prevent unauthorized access. Examples of such measures include:	***Yes***
7.2.1.2.a	Use of data and user authorization	***Yes***
7.2.1.2.b	Program unit ownership and other regional boundaries	***Yes***
7.2.1.2.c	One-end or two-end port protection devices	***Yes***
7.2.1.2.d	Security kernels	***Yes***
7.2.1.2.e	Computer-generated password keys	***Yes***
7.2.1.2.f	Special protocols	***Yes***
7.2.1.2.g	Message encryption	***Yes***
7.2.1.2.h	Controlled access security	***Yes***
7.2.1.2.end	Vendors also shall define and provide a detailed description of the methods used to prevent unauthorized access to the access control capabilities of the system itself.	***Yes***

Requirement	***Requirement Text***	***Conform***
7.3	Physical Security Measures A voting system's sensitivity to disruption or corruption of data depends, in part, on the physical location of equipment and data media, and on the establishment of secure telecommunications among various locations. Most often, the disruption of voting and vote counting results from a physical violation of one or more areas of the system thought to be protected. Therefore, security procedures shall address physical threats and the corresponding means to defeat them.	***Yes***
7.3.1	Polling Place Security	***Yes***
7.3.1	For polling place operations, vendors shall develop and provide detailed documentation of measures to enable poll workers to physically protect and perform orderly shutdown of voting equipment to counteract vandalism, civil disobedience, and similar occurrences.	***Yes***
7.3.1	The measures shall allow the immediate detection of tampering with vote casting devices and precinct ballot counters. They also shall control physical access to a telecommunications link if such a link is used	***Yes***
7.3.2	Central Count Location Security	***Yes***
7.3.2	Vendors shall develop and document in detail the measures to be taken in a central counting environment. These measures shall include physical and procedural controls related to the handling of ballot boxes, preparing of ballots for counting, counting operations and reporting data.	***Yes***
7.4	Software Security Voting systems shall meet specific security requirements for the installation of software and for protection against malicious software.	***Yes***
7.4.1	Software and Firmware Installation The system shall meet the following requirements for installation of software, including hardware with embedded firmware.	***Yes***
7.4.1.a	If software is resident in the system as firmware, the vendor shall require and state in the system documentation that every device is to be retested to validate each ROM prior to the start of elections operations.	***Yes***
7.4.1.b	To prevent alteration of executable code, no software shall be permanently installed or resident in the voting system unless the system documentation states that the jurisdiction must provide a secure physical and procedural environment for the storage, handling, preparation, and transportation of the system hardware.	***Yes***
7.4.1.c	The voting system bootstrap, monitor, and device-controller software may be resident permanently as firmware, provided that this firmware has been shown to be inaccessible to activation or control by any means other than by the authorized initiation and execution of the vote counting program, and its associated exception handlers.	***Yes***
7.4.1.d	The election-specific programming may be installed and resident as firmware, provided that such firmware is installed on a component (such as a computer chip) other than the component on which the operating system resides.	***Yes***
7.4.1.e	After initiation of election day testing, no source code or compilers or assemblers shall be resident or accessible.	***Yes***
7.4.2	Protection Against Malicious Software	***Yes***
7.4.2	Voting systems shall deploy protection against the many forms of threats to which they may be exposed such as file and macro viruses, worms, Trojan horses, and logic bombs. Vendors shall develop and document the procedures to be followed to ensure that such protection is maintained in a current status.	***Yes***
7.5	Telecommunications and Data Transmission There are four areas that must be addressed by telecommunications and data transmission security capabilities: access control, data integrity, detection and prevention of data interception, and protection against external threats.	***N/A***
7.5.1	Maintaining Data Integrity Voting systems that use telecommunications to communicate between system components and locations are subject to the same security requirements governing access to any other system hardware, software, and data function.	***N/A***

Requirement	***Requirement Text***	***Conform***
7.5.1.a	Voting systems that use electrical or optical transmission of data shall ensure the receipt of valid vote records is verified at the receiving station. This should include standard transmission error detection and correction methods such as checksums or message digest hashes. Verification of correct transmission shall occur at the voting system application level and ensure that the correct data is recorded on all relevant components consolidated within the polling place prior to the voter completing casting of his or her ballot.	***N/A***
7.5.1.b	Voting systems that use telecommunications to communicate between system components and locations before the polling place is officially closed shall:	***N/A***
7.5.1.b.i	Implement an encryption standard currently documented and validated for use by an agency of the U.S. government	***N/A***
7.5.1.b.ii	Provide a means to detect the presence of an intrusive process, such as an Intrusion Detection System	***N/A***
7.5.2	Protection Against External Threats	***N/A***
7.5.2.a	Voting systems that use public telecommunications networks shall implement protections against external threats to which commercial products used in the system may be susceptible.	***N/A***
7.5.2.b 7.5.2.b.i	Voting systems that use public telecommunications networks shall provide system documentation that clearly identifies all COTS hardware and software products and communications services used in the development and/or operation of the voting system, including operating systems, communications routers, modem drivers and dial-up networking software. i. Such documentation shall identify the name, vendor, and version used for each such component.	***N/A***
7.5.2.c.	Voting systems that use public telecommunications networks shall use protective software at the receiving-end of all communications paths to:	***N/A***
7.5.2.c.i	Detect the presence of a threat in a transmission	***N/A***
7.5.2.c.ii	Remove the threat from infected files/data	***N/A***
7.5.2.c.iii	Prevent against storage of the threat anywhere on the receiving device	***N/A***
7.5.2.c.iv	Provide the capability to confirm that no threats are stored in system memory and in connected storage media	***N/A***
7.5.2.c.v	Provide data to the system audit log indicating the detection of a threat and the processing performed	***N/A***
7.5.2.d	Vendors shall use multiple forms of protective software as needed to provide capabilities for the full range of products used by the voting system.	***N/A***
7.5.3	Monitoring and Responding to External Threats Voting systems that use public telecommunications networks may become vulnerable, by virtue of their system components, to external threats to the accuracy and integrity of vote recording, vote counting, and vote consolidation and reporting processes. Therefore, vendors of such systems shall document how they plan to monitor and respond to known threats to which their voting systems are vulnerable. This documentation shall provide a detailed description, including scheduling information, of the procedures the vendor will use to:	***N/A***
7.5.4	Shared Operating Environment Ballot recording and vote counting can be performed in either a dedicated or non-dedicated environment. If ballot recording and vote counting operations are performed in an environment that is shared with other data processing functions, both hardware and software features shall be present to protect the integrity of vote counting and of vote data. Systems that use a shared operating environment shall:	***Yes***
7.5.4.a.	Use security procedures and logging records to control access to system functions	***Yes***
7.5.4.b	Partition or compartmentalize voting system functions from other concurrent functions at least logically, and preferably physically as well	***Yes***
7.5.4.c	Control system access by means of passwords, and restrict account access to necessary functions only	***Yes***

Requirement	*Requirement Text*	*Conform*
7.5.4.d	Have capabilities in place to control the flow of information, precluding data leakage through shared system resources	***Yes***
7.5.5	Incomplete Election Returns If the voting system provides access to incomplete election returns and interactive inquiries before the completion of the official count, the system shall:	***Yes***
7.5.5.a.	Be designed to provide external access to incomplete election returns (for equipment that operates in a central counting environment), only if that access for these purposes is authorized by the statutes and regulations of the using agency. This requirement applies as well to polling place equipment that contains a removable memory module or that may be removed in its entirety to a central place for the consolidation of polling place returns	***Yes***
7.5.5.b	Design voting system software and its security environment such that data accessible to interactive queries resides in an external file or database created and maintained by the elections software under the restrictions applying to any other output report:	***Yes***
7.5.5.b.i	The output file or database has no provision for write access back to the system	***Yes***
7.5.5.b.ii	Persons whose only authorized access is to the file or database are denied write access, both to the file or database, and to the system	***Yes***
7.6	Use of Public Communications Networks Voting systems that transmit data over public telecommunications networks face security risks that are not present in other voting systems. This section describes standards applicable to voting systems that use public telecommunications networks.	***N/A***
7.6.1	Data Transmission All systems that transmit data over public telecommunications networks shall:	***N/A***
7.6.1.a	Preserve the secrecy of voter ballot selections and prevent anyone from violating ballot privacy	***N/A***
7.6.1.b	Employ digital signatures for all communications between the vote server and other devices that communicate with the server over the network	***N/A***
7.6.1.c	Require that at least two authorized election officials activate any critical operation regarding the processing of ballots transmitted over a public communications network, i.e. the passwords or cryptographic keys of at least two employees are required to perform processing of votes	***N/A***
7.6.2	Casting Individual Ballots Systems designed for transmission of telecommunications over public networks shall meet security standards that address the security risks attendant with the casting of ballots from polling places controlled by election officials using voting devices configured and installed by election officials and/or their vendor or contractor, and using in-person authentication of individual voters.	***N/A***
7.6.2.1	Documentation of Mandatory Security Activities Vendors of voting systems that cast individual ballots over a public telecommunications network shall provide detailed descriptions of:	***N/A***
7.6.2.1.a	All activities mandatory to ensuring effective voting system security to be performed in setting up the system for operation, including testing of security before an election	***N/A***
7.6.2.1.b	All activities that should be prohibited during voting equipment setup and during the timeframe for voting operations, including both the hours when polls are open and when polls are closed	***N/A***
7.6.2.2	Ability to Operate During Interruption of Service These systems shall provide the following capabilities to provide resistance to interruptions of telecommunications service that prevent voting devices at the polling place from communicating with external components via telecommunications:	***N/A***
7.6.2.2.a	Detect the occurrence of a telecommunications interruption at the polling place and switch to an alternative mode of operation that is not dependent on the connection between polling place voting devices and external system components	***N/A***

Requirement	*Requirement Text*	*Conform*
7.6.2.2.b	Provide an alternate mode of operation that includes the functionality of a conventional electronic voting system without losing any single vote	*N/A*
7.6.2.2.c	Create and preserve an audit trail of every vote cast during the period of interrupted communication and system operation in conventional electronic voting system mode	*N/A*
7.6.2.2.d	Upon reestablishment of communications, transmit and process votes accumulated while operating in conventional electronic voting system mode with all security safeguards in effect	*N/A*
7.6.2.2.e	Ensure that all safeguards related to voter identification and authentication are not affected by the procedures employed by the system to counteract potential interruptions of telecommunications capabilities	*N/A*
7.7	Wireless Communications This section provides requirements for implementing and using wireless communications within a voting system. These requirements reduce, but do not eliminate, the risk of using wireless communications for voting systems. (See VVSG Vol. 1 Section 7 for further information pertaining to Wireless)	*N/A*
7.7.2	Identifying Usage Since there are a wide variety of wireless technologies (both standard and proprietary) and differing physical properties of wireless signals, it is important to identify some of the characteristics of the wireless technologies used in the voting system.	*N/A*
7.7.2.a	If a voting system provides wireless communications capabilities, then there shall be a method for determining the existence of the wireless communications capabilities.	*N/A*
7.7.2.b	If a voting system provides wireless communications capabilities, then there shall be an indication that allows one to determine when the wireless communications (such as radio frequencies) capability is active.	*N/A*
7.7.2.c	The indication shall be visual.	*N/A*
7.7.2.d	If a voting system provides wireless communications capabilities, then the type of wireless communications used (such as radio frequencies) shall be identified either via a label or via the voting system documentation.	*N/A*
7.7.3	Protecting Transmitted Data The transmitted data, especially via wireless communications, needs to be protected to ensure confidentiality and integrity. Examples of election information that needs to be protected include: ballot definitions, voting device counts, precinct counts, opening of poll signal, and closing of poll signal. Examples of other information that needs to be protected include: protocol messages, address or device identification information, and passwords. Since radio frequency wireless signals radiate in all directions and pass through most construction material, anyone may easily receive the wireless signals. In contrast, infrared signals are line of sight and do not pass through most construction material. However, infrared signals can still be received by other devices that are in the line of sight. Similarly, wireless signals can be transmitted by others to create unwanted signals. Thus, encryption is required to protect the privacy and confidentiality of the voting information.	*N/A*
7.7.3.a	All information transmitted via wireless communications shall be encrypted and authenticated--with the exception of wireless T-coil coupling--to protect against eavesdropping and data manipulation including modification, insertion, and deletion.	*N/A*
7.7.3.a.i	The encryption shall be as defined in Federal Information Processing Standards (FIPS) 197, "Advanced Encryption Standard (AES)."	*N/A*
7.7.3.a.ii	The cryptographic modules used shall comply with FIPS 140-2, Security Requirements for Cryptographic Modules.	*N/A*
7.7.3.b	The capability to transmit non-encrypted and non-authenticated information via wireless communications shall not exist.	*N/A*
7.7.3.c	If audible wireless communication is used, and the receiver of the wireless transmission is the human ear, then the information shall not be encrypted. Discussion: This specifically covers wireless T-Coil coupling for assistive devices used by people who are hard of hearing.	*N/A*

Requirement	***Requirement Text***	***Conform***
7.7.4	Protecting the Wireless Path If wireless communications are used, then the following capabilities shall exist in order to mitigate the effects of a denial of service (DoS) attack:	***N/A***
7.7.4.a	The voting system shall be able to function properly throughout a DoS attack, since the DoS attack may continue throughout the voting period.	***N/A***
7.7.4.b	The voting system shall function properly as if the wireless capability were never available for use.	***N/A***
7.7.4.c	Alternative procedures or capabilities shall exist to accomplish the same functions that the wireless communications capability would have done.	***N/A***
7.7.4.d	If infrared is being used, the shielding shall be strong enough to prevent escape of the voting system signal, as well as strong enough to prevent infrared saturation jamming. Discussion: Since infrared has the line-of-sight property, securing the wireless path can be accomplished by shielding the path between the communicating devices with an opaque enclosure. However, this is only practical for short distances. This shielding would also help prevent accidental eye damage from the infrared signal.	***N/A***
7.7.5	Protecting the Voting System Physical security measures to prevent access to a voting system are not possible when using a wireless communications interface because there is no discrete physical communications path that can be secured.	***N/A***
7.7.5.a	The security requirements in Subsection 2.1.1 shall be applicable to systems with wireless communications.	***N/A***
7.7.5.b	The accuracy requirements in Subsection 2.1.2 shall be applicable to systems with wireless communications.	***N/A***
7.7.5.c	The use of wireless communications that may cause impact to the system accuracy through electromagnetic stresses is prohibited.	***N/A***
7.7.5.d	The error recovery requirements in Subsection 2.1.3 shall be applicable to systems with wireless communications.	***N/A***
7.7.5.e	All wireless communications actions shall be logged.	***N/A***
7.7.5.e.i	The log shall contain at least the following entries: times when the wireless is activated and deactivated, services accessed, identification of device to which data was transmitted to or received from, identification of authorized user, and successful and unsuccessful attempts to access wireless communications or service. Discussion: Other information such as the number of frames or packets transmitted or received at various logical layers may be useful, but is dependent on the wireless technology used.	***N/A***
7.7.5.f	Device authentication shall occur before any access to, or services from, the voting system are granted through wireless communications. Discussion: Authentication is an important element to protect the security of wireless communications. Authentication verifies the identity and legitimacy of users, devices, and services.	***N/A***
7.7.5.f.i	User authentication shall be at least level 2 as per NIST Special Publication 800-63 Version 1.0.1, Electronic Authentication Guideline.	***N/A***
7.8	Independent Verification Systems	***N/A***
7.8.1	Overview Independent verification (IV) systems are electronic voting systems that produce multiple independent cast vote records of voter ballot selections, which can be audited to a high level of precision. For this to happen, the cast vote records must be handled according to the following protocol: At least two cast vote records of the voter's selections are produced and one of the records is then stored in a manner that it cannot be modified by the voting system. For example	***N/A***

Requirement	***Requirement Text***	***Conform***
7.8.2	Basic Characteristics of IV Systems This section describes a preliminary set of basic characteristics that apply to all types of IV systems. This information is provided for the purpose of introducing these concepts for consideration in voting system design. It is anticipated that future voting systems will be required to provide some type of independent verification feature to enable voters to have confidence that their ballot selections are correctly recorded and counted.	***N/A***
7.9	Voter Verifiable Paper Audit Trail Requirements This section contains requirements for DREs with a Voter Verifiable Paper Audit Trail (VVPAT) component. VVPAT capability is not required for national certification. However, these requirements will be applied for certification testing of DRE systems that are intended for use in states that require DREs to provide this capability. The vendor's certification testing application to the EAC must indicate whether the system being presented for testing includes this capability, as provided under Subsection 1.6.2.5 extensions.	***N/A***
7.9.1	Display and Print a Paper Record	***N/A***
7.9.1.a	The voting system shall print and display a paper record of the voter ballot selections prior to the voter making his or her selections final by casting the ballot. Discussion: This is the basic requirement for VVPAT capability. It requires the paper record to be created as a distinct representation of the voter ballot selections. It requires the paper record to contain the same information as the electronic record and be suitable for use in verifications of the voting machine's electronic records.	***N/A***
7.9.1.b	The paper record shall constitute a complete record of ballot selections that can be used to assess the accuracy of the voting machine's electronic record, to verify the election results, and, if required by state law, in full recounts. Discussion: This requirement exists to make clear that it is possible to use the paper record for checks of the voting machine's accuracy in recording voter ballot selections, as well as usable for election audits (such as mandatory 1% recounts). The paper record shall also be suitable for use in full recounts of the election if required by state law.	***N/A***
7.9.1.c	The paper record shall contain all voter selection information stored in the electronic (ballot image) record. Discussion: The electronic ballot image record cannot hide any information related to ballot selections; all information relating to voter selections must be equally present in both records. The electronic record may contain other items that don't necessarily need to be on the paper record, such as digital signature information.	***N/A***
7.9.2	Approve or Void the Paper Record	***N/A***
7.9.2.a	The voting equipment shall allow the voter to approve or void the paper record. Discussion: There are three possible scenarios regarding the voter's disposition of the paper record. The voter can verify that the ballot selections displayed on the DRE summary screen and those printed on the paper record are the same. If they are	***N/A***
7.9.2.b	The voting equipment shall, in the presence of the voter, mark the paper record as being approved by the voter if the ballot selections are accepted; or voided or if the voter decides to change one or more selections.	***N/A***
7.9.2.c	If the records do not match, the voting equipment shall mark and preserve the paper record and shall provide a means to preserve the corresponding electronic record so the source of error or malfunction can be analyzed. Discussion: The voting machine shall be withdrawn from service immediately and its use discontinued in accordance with jurisdiction procedures.	***N/A***
7.9.2.d	The voting machine shall not record the electronic record until the paper record has been approved by the voter.	***N/A***

Requirement	***Requirement Text***	***Conform***
7.9.2.e	Vendor documentation shall include procedures to enable the election official to return a voting machine to correct operation after a voter has used it incompletely or incorrectly. This procedure shall not cause discrepancies between the tallies of the electronic and paper records.	***N/A***
7.9.3	Electronic and Paper Record Structure	***N/A***
7.9.3.a	All cryptographic software in the voting system shall be approved by the U.S. Government's Cryptographic Module Validation Program, as applicable. Discussion: Cryptographic software may be used for a number of different purposes, including calculating checksums, encrypting records, authentication, generating random numbers, and digital signatures. This software should be reviewed and approved by the Cryptographic Module Validation Program (CMVP). There may be cryptographic voting schemes where the cryptographic algorithms used are necessarily different from any algorithms that have approved CMVP implementations, thus CMVP approved software should be used where feasible but is not required. The CMVP website is http://csrc.nist.gov/cryptval.	***N/A***
7.9.3.b	The electronic ballot image and paper records shall include information about the election.	***N/A***
7.9.3.b.i	The voting equipment shall be able to include an identification of the particular election, the voting site and precinct, and the voting machine. Discussion: If the voting site and precinct are different, both should be included.	***N/A***
7.9.3.b.ii	The records shall include information identifying whether the balloting is provisional, early, or on election day, and information that identifies the ballot style in use.	***N/A***
7.9.3.b.iii	The records shall include a voting session identifier that is generated when the voting equipment is placed in voting mode, and that can be used to identify the records as being created during that voting session. Discussion: If there are several voting sessions on the same voting machine on the same day, the voting session identifiers must be different. They should be generated from a random number generator.	***N/A***
7.9.3.c	The electronic ballot image and paper records shall be linked by including a unique identifier within each record that can be used to identify each record uniquely and each record's corresponding record. Discussion: The identifier serves the purpose of uniquely identifying and linking the records for cross-checking.	***N/A***
7.9.3.d	The voting machine should generate and store a digital signature for each electronic record.	***N/A***
7.9.3.e	The electronic ballot image records shall be able to be exported for auditing or analysis on standards-based and /or COTS information technology computing platforms.	***N/A***
7.9.3.e.i	The exported electronic ballot image records shall be in a publicly available, non-proprietary format. Discussion: It is advantageous when all electronic records, regardless of manufacturer, use the same format or can easily be converted to a publicly available, non-proprietary format; for example, the OASIS Election Markup Language (EML) Standard.	***N/A***
7.9.3.e.ii	The records should be exported with a digital signature, which shall be calculated on the entire set of electronic records and their associated digital signatures. Discussion: This is necessary to determine if records are missing or substituted.	***N/A***
7.9.3.e.iii	The voting system vendor shall provide documentation as to the structure of the exported ballot image records and how they shall be read and processed by software.	***N/A***
7.9.3.e.iv	The voting system vendor shall provide a software program that will display the exported ballot image records and that may include other capabilities such as providing vote tallies and indications of undervotes.	***N/A***
7.9.3.vi	The voting system vendor shall provide full documentation of procedures for exporting electronic ballot image records and reconciling those records with the paper audit records.	***N/A***
7.9.3.f	The paper record should be created in a format that may be made available across different manufacturers of electronic voting systems. Discussion: There may be a future requirement for some commonality in the format of paper records.	***N/A***

Requirement	***Requirement Text***	***Conform***
7.9.3.g	The paper record shall be created such that its contents are machine readable. Discussion: This can be done by using specific OCR fonts or barcodes.	***N/A***
7.9.3.g.i	The paper record shall contain error correcting codes for the purpose of detecting read errors and for preventing other markings on the paper record from being misinterpreted when machine reading the paper record. Discussion: This requirement is not mandatory if a state prohibits the paper record from containing any information that cannot be read and understood by the voter. This requirement serves the purpose of detecting scanning errors and preventing stray or deliberate markings on the paper from being interpreted as valid data.	***N/A***
7.9.3.h	If barcode is used, the voting equipment shall be able to print a barcode with each paper record that contains the human-readable contents of the paper record. Discussion: This requirement is not mandatory if a state prohibits the paper record from containing any information that cannot be read and understood by the voter.	***N/A***
7.9.3.h.i	The barcode shall use an industry standard format and shall be able to be read using readily available commercial technology. Discussion: Examples of such codes are Maxi Code or PDF417.	***N/A***
7.9.3.h.ii	If the corresponding electronic record contains a digital signature, the digital signature shall be included in the barcode on the paper record.	***N/A***
7.9.3.h.iii	The barcode shall not contain any information other than the paper record's human-readable content, error correcting codes, and digital signature information.	***N/A***
7.9.4	Equipment Security and Reliability	***N/A***
7.9.4.a	The voting machine shall provide a standard, publicly documented printer port (or the equivalent) using a standard communication protocol. Discussion: Using a standard, publicly documented printer protocol assists in security evaluations of system software.	***N/A***
7.9.4.b	Tamper-evident seals or physical security measures shall protect the connection between the printer and the voting machine.	***N/A***
7.9.4.c	If the connection between the voting machine and the printer has been broken, the voting machine shall detect this event and record it in the DRE internal audit log.	***N/A***
7.9.4.d	The paper path between the printing, viewing and storage of the paper record shall be protected and sealed from access except by authorized election officials.	***N/A***
7.9.4.e	The printer shall not be permitted to communicate with any system or machine other than the voting machine to which it is connected.	***N/A***
7.9.4.f	The printer shall only be able to function as a printer; it shall not contain any other services (e.g., provide copier or fax functions) or network capability.	***N/A***
7.9.4.g	The voting machine shall detect errors and malfunctions such as paper jams or low supplies of consumables such as paper and ink that may prevent paper records from being correctly displayed, printed or stored. Discussion: This could be accomplished in a variety of different ways; for example, a printer that is out of paper or jammed could issue audible alarms, with the alarm different for each condition.	***N/A***
7.9.4.h	If an error or malfunction occurs, the voting machine shall suspend voting operations and should present a clear indication to the voter and election officials of the malfunction.	***N/A***
7.9.4.i	The voting machine shall not record votes if an error or malfunction occurs.	***N/A***
7.9.4.j	Printing devices should contain sufficient supplies of paper and ink to avoid reloading or opening equipment covers or enclosures and thus potential circumvention of security features; or be able to reload paper and ink with minimal disruption to voting and without circumvention of security features such as seals.	***N/A***
7.9.4.k	Vendor documentation shall include procedures for investigating and resolving printer malfunctions including, but not limited to; printer operations, misreporting of votes, unreadable paper records, and power failures.	***N/A***

Requirement	***Requirement Text***	***Conform***
7.9.4.l	Vendor documentation shall include printer reliability specifications including Mean Time Between Failure estimates, and shall include recommendations for appropriate quantities of backup printers and supplies.	***N/A***
7.9.4.m	Protective coverings intended to be transparent on voting equipment shall be maintainable via a predefined cleaning process. If the coverings become damaged such that they obscure the paper record, they shall be replaceable.	***N/A***
7.9.4.n	The paper record shall be sturdy, clean, and of sufficient durability to be used for verifications, reconciliations, and recounts conducted manually or by automated processing.	***N/A***
7.9.5	Preserving Voter Privacy VVPAT records can be printed and stored by two different methods: Printed and stored on a continuous spool-to-spool paper roll where the voter views the paper record in a window " Printed on separate pieces of paper	***N/A***
7.9.5.a	Voter privacy shall be preserved during the process of recording, verifying and auditing his or her ballot selections. Discussion: The privacy requirements from Section 3 also apply to voting equipment with VVPAT.	***N/A***
7.9.5.b	When a VVPAT with a spool-to-spool continuous paper record is used, a means shall be provided to preserve the secrecy of the paper record of voter selections.	***N/A***
7.9.5.c	When a VVPAT with a spool-to-spool continuous paper record is used, no record shall be maintained of which voters used which voting machine or the order in which they voted.	***N/A***
7.9.5.d	The electronic and paper records shall be created and stored in ways that preserve the privacy of the voter. Discussion: For VVPAT systems that use separate pieces of paper for the record, this can be accomplished in various ways including shuffling the order of the records or other methods to separate the order of stored records.	***N/A***
7.9.5.e	The privacy of voters whose paper records contain an alternative language shall be maintained.	***N/A***
7.9.5.f	Unique identifiers shall not be displayed in a way that is easily memorable by the voter. Discussion: Unique identifiers on the paper record are displayed or formatted in such a way that they are not memorable to voters, such as by obscuring them in other characters.	***N/A***
7.9.5.g	Both paper rolls and paper record secure receptacles shall be controlled, protected, and preserved with the same security as a ballot box.	***N/A***
7.9.6	VVPAT Usability	***N/A***
7.9.6.a	All usability requirements from Subsection 3.1 shall apply to voting machines with VVPAT. Discussion: The requirements in this section are in addition to those in Subsection 3.1.	***N/A***
7.9.6.b	The voting equipment shall be capable of showing the information on the paper in a font size of at least 3.0 mm and should be capable of showing the information in at least two font ranges; 3.0-4.0 mm, and 6.3-9.0 mm, under control of the voter or poll worker. Discussion: In keeping with requirements in Subsection 3.1, the paper record should use the same font sizes as displayed by the voting machine, but at least be capable of 3.0 mm. While larger font sizes may assist voters with poor vision, certain disabilities such as tunnel vision are best addressed by smaller font sizes.	***N/A***
7.9.6.c	The voting equipment shall display, print and store the paper record in any of the written alternative languages chosen for the ballot.	***N/A***
7.9.6.c.i	To assist with manual auditing, candidate names on the paper record shall be presented in the same language as used on the DRE summary screen.	***N/A***
7.9.6.c.ii	Information on the paper record not needed by the voter to perform verification shall be in English. Discussion: In addition to the voter ballot selections, the marking of the paper record as accepted or void, and the indication of the ballot page number need to be printed in the alternative language. Other information, such as precinct and election identifiers, shall be in English to facilitate use of the paper record for auditing.	***N/A***

Requirement	*Requirement Text*	*Conform*
7.9.6.d	The paper and electronic records shall be presented to allow the voter to read and compare the records without the voter having to shift his or her position.	***N/A***
7.9.6.e	If the paper record cannot be displayed in its entirety on a single page, a means shall be provided to allow the voter to view the entire record. Discussion: Possible solutions include scrolling the paper or printing a new sheet of paper. The voter should be notified if it is not possible to scroll in reverse, so they will know to complete verification in one pass.	***N/A***
7.9.6.f	If the paper record cannot be displayed in its entirety on a single page, each page of the record shall be numbered and shall include the total count of pages for the record. Discussion: Possible numbering schemes include "Page X of Y."	***N/A***
7.9.6.g	The instructions for performing the verification process shall be made available to the voter in a location on the voting machine. Discussion: All instructions must meet the usability requirements contained in Subsection 3.1.	***N/A***
7.9.7	VVPAT Accessibility	***N/A***
7.9.7.a	All accessibility requirements from Subsection 3.2 shall apply to voting machines with VVPAT.	***N/A***
7.9.7.b	If the normal voting procedure includes VVPAT, the accessible voting equipment should provide features that enable voters who are visually impaired and voters with an unwritten language to perform this verification. If state statute designates the paper record produced by the VVPAT to be the official ballot or the determinative record on a recount, the accessible voting equipment shall provide features that enable visually impaired voters and voters with an unwritten language to review the paper record. Discussion: For example, the accessible voting equipment might provide an automated reader that converts the paper record contents into audio output.	***N/A***
8	Quality Assurance Requirements	***Yes***
8.2	General Requirements The voting system vendor is responsible for designing and implementing a quality assurance program to ensure that the design, workmanship, and performance requirements are achieved in all delivered systems and components. At a minimum, this program shall:	***Yes***
8.2.a	Include procedures for specifying, procuring, inspecting, accepting, and controlling parts and raw materials of the requisite quality	***Yes***
8.2.b	Require the documentation of the hardware and software development process	***Yes***
8.2.c.i	Identify and enforce all requirements for: In-process inspection and testing that the manufacturer deems necessary to ensure proper fabrication and assembly of hardware	***Yes***
8.2.c.ii	Identify and enforce all requirements for: Installation and operation of software and firmware	***Yes***
8.2.d	Include plans and procedures for post-production environmental screening and acceptance testing	***Yes***
8.2.e	Include a procedure for maintaining all data and records required to document and verify the quality inspections and tests	***Yes***
8.3	Components from Third Parties	***Yes***
8.3	A vendor who does not manufacture all the components of its voting system, but instead procures components as standard commercial items for assembly and integration into a voting system, shall verify that the supplier vendors follow documented quality assurance procedures that are at least as stringent as those used internally by the voting system vendor.	***Yes***
8.4	Responsibility for Tests	***Yes***

Requirement	***Requirement Text***	***Conform***
8.4	The manufacturer or vendor shall be responsible for performing all quality assurance tests, acquiring and documenting test data, and providing test reports for examination by the test lab as part of the national certification process. These reports shall also be provided to the purchaser upon request.	***Yes***
8.5	Parts & Materials Special Tests and Examinations In order to ensure that voting system parts and materials function properly, vendors shall:	***Yes***
8.5.a	Select parts and materials to be used in voting systems and components according to their suitability for the intended application. Suitability may be determined by similarity of this application to existing standard practice or by means of special tests	***Yes***
8.5.b	Design special tests, if needed, to evaluate the part or material under conditions accurately simulating the actual voting system operating environment	***Yes***
8.5.c	Maintain the resulting test data as part of the quality assurance program documentation	***Yes***
8.6	Quality Conformance Inspections The vendor performs conformance inspections to ensure the overall quality of the voting system and components delivered to the test lab for national certification testing and to the jurisdiction for implementation. To meet the conformance inspection requirements the vendor or manufacturer shall:	***Yes***
8.6.a	Inspect and test each voting system or component to verify that it meets all inspection and test requirements for the system	***Yes***
8.6.b	Deliver a record of tests or a certificate of satisfactory completion with each system or component	***Yes***
8.7	Documentation Vendors are required to produce documentation to support the independent testing required for their products to be granted national certification. Volume II, Section 2, Description of the Technical Data Package, identifies the documentation required for the national certification testing process. This documentation shall be sufficient to serve the needs of the test lab, election officials, and maintenance technicians. It shall be prepared and published in accordance with standard commercial practice for information technology and electronic and mechanical equipment. It shall include, at a minimum, the following: • System overview • System functionality description • System hardware specification • Software design and specifications • System security specification • System test and verification specification • System operations procedures • System maintenance procedures • Personnel deployment and training requirements • Configuration management plan • Quality assurance program • System change notes	***Yes***
9	Configuration Management This section contains specific requirements for configuration management of voting systems. For the purpose of the Guidelines, configuration management is defined as a set of activities and associated practices that ensures full knowledge and control of the components of a system, starting with its initial development and progressing through its ongoing maintenance and enhancement. This section describes activities in terms of their purposes and outcomes. It does not describe specific procedures or steps to be employed to accomplish them. Specific steps and procedures are left to the vendor to select.	***Yes***
9.1.1	Configuration Management Requirements	***Yes***

Requirement	***Requirement Text***	***Conform***
9.1.1	Configuration management addresses a broad set of record keeping, auditing, and reporting activities that contribute to full knowledge and control of a system and its components. These activities include: Identifying discrete system components " Creating records of a formal baseline and later versions of components " Controlling changes made to the system and its components " Releasing new versions of the system " Auditing the system	***Yes***
9.1.2	Organization of Configuration Management Requirements	***Yes***
9.1.2	The requirements for configuration management include: • Application of configuration management requirements • Configuration management policy • Configuration identification • Baseline, promotion, and demotion procedures • Configuration control procedures • Release process • Configuration audits • Configuration management resources	***Yes***
9.1.3	Application of Configuration Management Requirements	***Yes***
9.1.3	Requirements for configuration management apply to all components of voting systems regardless of the specific technologies employed. These components include: Software " Hardware " Communications " Documentation " Identification and naming conventions (including changes to these conventions) for software programs and data files " Development and testing artifacts such as test data and scripts " File archiving and data repositories "	***Yes***
9.2	Configuration Management Policy	***Yes***
9.2	The vendor shall describe its policies for configuration management in the Technical Data Package. This description shall address the following elements: Scope and nature of configuration management program activities " Breadth of application of the vendor's policies and practices to the voting system	***Yes***
9.3	Configuration Identification Configuration identification is the process of identifying, naming, and acquiring configuration items. Configuration identification encompasses all system components.	***Yes***
9.3.1	Classification and Naming Configuration Items	***Yes***
9.3.1	The vendor shall describe the procedures and conventions used to classify configuration items into categories and subcategories, uniquely number or otherwise identify configuration items and name configuration items.	***Yes***
9.3.2	Versioning Conventions When a system component is part of a higher level system element such as a subsystem, the vendor shall describe the conventions used to:	***Yes***
9.3.2.a	Identify the specific versions of individual configuration items and sets of items that are incorporated in higher level system elements such as subsystems	***Yes***
9.3.2.b	Uniquely number or otherwise identify versions	***Yes***
9.3.2.c	Name versions	***Yes***
9.4	Baseline and Promotion Procedures The vendor shall establish formal procedures and conventions for establishing and providing a complete description of the procedures and related conventions used to:	***Yes***
9.4.a	Establish a particular instance of a component as the starting baseline	***Yes***

Requirement	***Requirement Text***	***Conform***
9.4.b	Promote subsequent instances of a component to baseline status as development progresses through to completion of the initial completed version released to the accredited test lab for testing	***Yes***
9.4.c	Promote subsequent instances of a component to baseline status as the component is maintained throughout its life cycle until system retirement (i.e., the system is no longer sold or maintained by the vendor)	***Yes***
9.5	Configuration Control Procedures Configuration control is the process of approving and implementing changes to a configuration item to prevent unauthorized additions, changes or deletions. The vendor shall establish such procedures and related conventions, providing a complete description of those procedures used to:	***Yes***
9.5.a	Develop and maintain internally developed items	***Yes***
9.5.b	Acquire and maintain third-party items	***Yes***
9.5.c	Resolve internally identified defects for items regardless of their origin	***Yes***
9.5.d	Resolve externally identified and reported defects (i.e., by customers and accredited test labs)	***Yes***
9.6	Release Process The release process is the means by which the vendor installs, transfers or migrates the system to the accredited test lab and, eventually, to its customers. The vendor shall establish such procedures and related conventions, providing a complete description of those used to:	***Yes***
9.6.a	Perform a first release of the system to an accredited test lab	***Yes***
9.6.b	Perform a subsequent maintenance or upgrade release of the system or particular components, to an accredited test lab	***Yes***
9.6.c	Perform the initial delivery and installation of the system to a customer, including confirmation that the installed version of the system matches exactly the certified system version	***Yes***
9.6.d	Perform a subsequent maintenance or upgrade release of the system or a particular component to a customer, including confirmation that the installed version of the system matches exactly the certified system version	***Yes***
9.7	Configuration Audits	***Yes***
9.7.1	Physical Configuration Audit The Physical Configuration Audit is conducted by the accredited test lab to compare the voting system components submitted for certification to the vendor's technical documentation. For the PCA, a vendor shall provide:	***Yes***
9.7.1.a	Identification of all items that are to be a part of the software release	***Yes***
9.7.1.b	Specification of compiler (or choice of compilers) to be used to generate executable programs	***Yes***
9.7.1.c	Identification of all hardware that interfaces with the software	***Yes***
9.7.1.d	Configuration baseline data for all hardware that is unique to the system	***Yes***
9.7.1.e	Copies of all software documentation intended for distribution to users, including program listings, specifications, operations manual, voter manual, and maintenance manual	***Yes***
9.7.1.f	User acceptance test procedures and acceptance criteria	***Yes***

Requirement	***Requirement Text***	***Conform***
9.7.1.g	Identification of any changes between the physical configuration of the system submitted for the PCA and that submitted for the FCA, with a certification that any differences do not degrade the functional characteristics	***Yes***
9.7.1.h.i	Complete descriptions of its procedures and related conventions used to support this audit by: Establishing a configuration baseline of the software and hardware to be tested	***Yes***
9.7.1.h.ii	Complete descriptions of its procedures and related conventions used to support this audit by: Confirming whether the system documentation matches the corresponding system components	***Yes***
9.7.2	Functional Configuration Audit The Functional Configuration Audit is conducted by the accredited test lab to verify that the system performs all the functions described in the system documentation. The vendor shall:	***Yes***
9.7.2.a	Completely describe its procedures and related conventions used to support this audit for all system components	***Yes***
9.7.2.b.i	Provide the following information to support this audit: Copies of all procedures used for module or unit testing, integration testing, and system testing	***Yes***
9.7.2.b.ii	Provide the following information to support this audit: Copies of all test cases generated for each module and integration test, and sample ballot formats or other test cases used for system tests	***Yes***
9.7.2.b.iii	Provide the following information to support this audit: Records of all tests performed by the procedures listed above, including error corrections and retests	***Yes***
9.8	Configuration Management Resources Often, configuration management activities are performed with the aid of automated tools. Assuring that such tools are available throughout the system life cycle, including if the vendor is acquired by or merged with another organization, is critical to effective configuration management. Vendors may choose the specific tools they use to perform the record keeping, audit, and reporting activities of the configuration management standards. The resources documentation standard provided below focus on assuring that procedures are in place to record information about the tools to help ensure that they, and the data they contain, can be transferred effectively and promptly to a third party should the need arise. Within this context, a vendor is required to develop and provide a complete description of the procedures and related practices for maintaining information about:	***Yes***
9.8.a	Specific tools used, current version, and operating environment;	***Yes***
9.8.b	Physical location of the tools, including designation of computer directories and files;	***Yes***
9.8.c	Procedures and training materials for using the tools.	***Yes***

APPENDIX F DOCUMENTATION MAP

This appendix provides a map of documentented procedures for system tasks that require significant cross-refernencing between multiple ES&S documents .

Table of Changes		
Revision	**Date of Change**	**Description of Change**
1.0	1.24.2012	Initial document
2.0	3.25.2012	Updated document footers.
3.0	4.17.2012	Updated document identifier in the footer.
4.0	8.15.2012	Removed components from the system configuration.

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1. Election Management System Installation 2

1. ELECTION MANAGEMENT SYSTEM INSTALLATION

Table F.1.1 catalogs the documented procedures for securing and installing your election management system. Skip any procedures that are not required for your system configuration.

Required Task or Product installation	Documented Procedure	EMS Server	EMS Workstation	SFTP Server	Reporting Only
		Configurations			
1. Secure the EMS PC	*Hardening the EMS PC Guide* (EVS5000_SSS02_Hardening Procedures)		●		●
2. Install Windows 7	*Hardening the EMS PC Guide* (EVS5000_SSS02_Hardening Procedures)		●		●
3. Install Windows Server 2008 R2	*Hardening the EMS PC Guide* (EVS5000_SSS02_Hardening Procedures)	●		●	
4. AVG Business 2011	*Hardening the EMS PC Guide* (EVS5000_SSS02_Hardening Procedures)	●	●	●	●
5. Install Cerberus FTP	*Network Configuration Guide* (EVS5000_SOP00_NetworkConfigurationGuide)	●		●	
6. Install Adobe Acrobat Standard version 9.0 or better.	OEM or COTS install instructions		●		
7. Install RM/Cobol 12.06	*Election Reporting Manager User's Guide* (EVS5000_SOP00_ERM)				●
8. Microsoft Office Excel 2003 or greater	OEM or COTS install instructions		●		
9. Install ES&S Event Log Service	*ES&S Event Log Service User's Guide* (EVS5000_SOP00_UELS)		●		●
10. Install Removable Media Service	*ElectionWare Administrator's Guide* (EVS5000_SOP00_ElectionWare01_Admin)		●		
11. Install Election Reporting Manager (ERM)	*Election Reporting Manager User's Guide* (EVS5000_SOP00_ERM)				●
12. Install VAT Preview	*ElectionWare Administrator's Guide* (EVS5000_SOP00_ElectionWare01_Admin)		●		
13. Install ElectionWare	*ElectionWare Administrator's Guide* (EVS5000_SOP00_ElectionWare01_Admin)	●	●		

Table F.1.1 Voting System Installation Documentation Map

wyle laboratories

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

TEST REPORT

REPORT NO.: T59087.01-01
WYLE JOB NO.: T59087.01
CLIENT P.O. NO.: ES&S-MSA-TA017
CONTRACT: N/A
TOTAL PAGES (INCLUDING COVER): 1486
DATE: May 16, 2013

Original Release: March 26, 2013
Revision A: May 1, 2013
Revision B: May 16, 2013

NATIONAL CERTIFICATION TEST REPORT FOR CERTIFICATION TESTING OF THE ELECTION SYSTEMS & SOFTWARE EVS 5.0.0.0 VOTING SYSTEM

EAC CERTIFICATION NUMBER – ESSEVS5000

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.

SEAL

SUBSCRIBED and sworn to before me this 16 day of May 20 13

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: Stephen Han, Project Engineer 5/16/13 Date

APPROVED BY: Frank Padilla, Voting Systems Manager 5/16/13 Date

WYLE Q. A.: For Raul Terceno, Q. A. Manager 5/16/13 Date

NVLAP LAB CODE 200771-0

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

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1.0 INTRODUCTION

1.1 Scope

This report presents the test results for a full certification testing campaign of the Election Systems & Software (ES&S) EVS 5.0.0.0 voting system. The primary purpose of Certification Testing was to demonstrate that the system meets or exceeds the requirements of the Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG). The certification test procedure was intended to discover non-conformities to the EAC 2005 VVSG for system operations which, should they occur in actual election use, could result in failure to complete election operations in a satisfactory manner. The tests were also intended to demonstrate system compliance with levels of design, performance, and quality claimed by the manufacturer.

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 the EAC to determine if the modified system requires a new application, or can be submitted as a modified system. The scope of testing required will be determined based upon the degree of modification.

1.2 Objective

The objective of this test program was to ensure that the ES&S EVS 5.0.0.0 complied with the hardware and software requirements of the EAC 2005 VVSG. The scope and detail of the requirements tested in certification were selected to correspond to the design and complexity of the system submitted by ES&S for testing. The examination included focused in-depth examination of the voting system, the inspection and evaluation of system documentation and execution of functional tests to verify system performance and function under normal and 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.
- 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 are included as appendices to this report. These includes: Notices of Anomaly, Hardware Test Report, Functional Configuration Audit Test Case Procedure Specification, Security Test Case Procedure Specification, Usability Test Case Procedure Specification, Election Definitions, Technical Data Package Review Report, Source Code Review Report, Physical Configuration Audit Report, Security Assessment Report, Deficiency Report, Summative Usability Report, Warrant of Accepting Change Control responsibility letter; Witnessed Build, as-run Certification Test Plan, Requirement Matrix, Conformity Statement, and Attestation of Durability.

1.0 INTRODUCTION (Continued)

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

A listing of the EVS 5.0.0.0 Voting System Technical Data Package (TDP) Documents submitted for this test effort is listed in Section 2.5, "Vendor Technical Data Package,"

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2.0 SYSTEM IDENTIFICATION AND OVERVIEW

2.1 System Overview

The ES&S EVS 5.0.0.0 Voting System is a paper-based, digital scan voting system. The EVS 5.0.0.0 Voting System hardware consists of five 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 Scanner – DS200
4. Polling Place American Disability Act (ADA) Devices – AutoMARK A100, AutoMARK A200, and AutoMARK A300
5. Central Count Digital Scanner – DS850

The following paragraphs describe the design and structure of the EVS 5.0.0.0 Voting System as taken from the ES&S Technical Documentation.

2.1.1 System Hardware

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.

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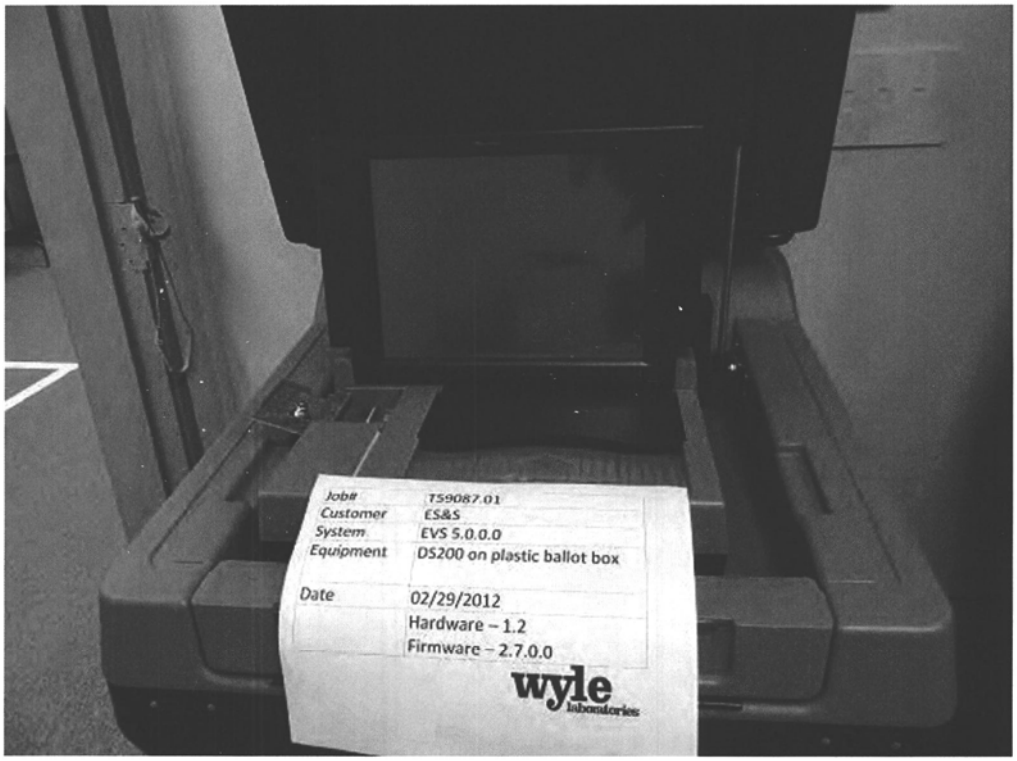

Photograph No. 1: DS200 (on plastic ballot box)

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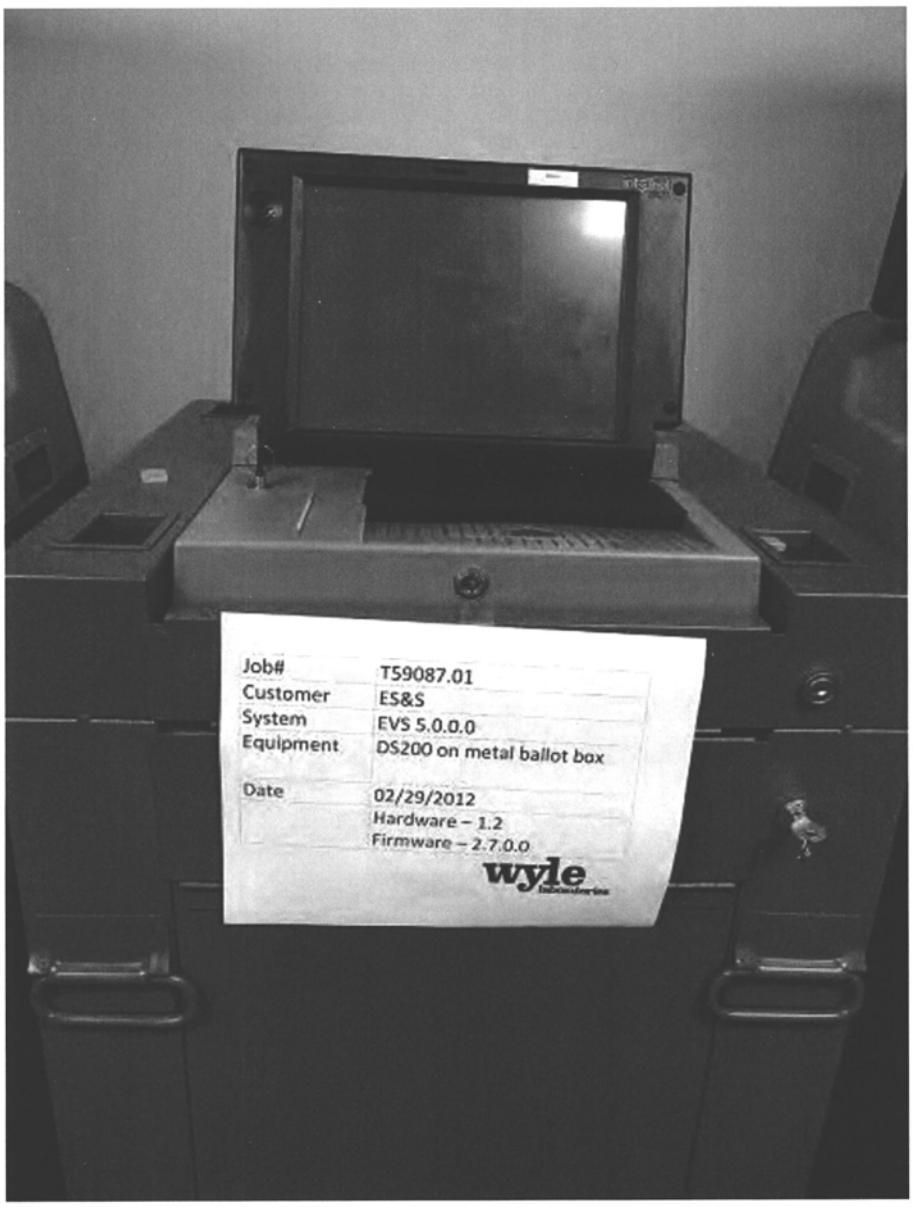

Photograph No. 2: DS200 (on metal ballot box)

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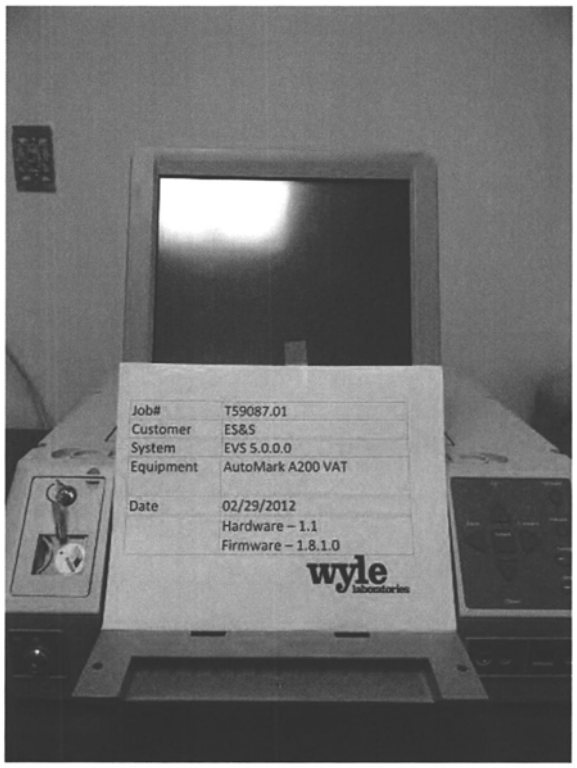
Electronic Ballot Marking Device: AutoMARK™ Voter Assist Terminal (VAT)

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. Since this change is so minor, the A300 equipment was only tested in the Accuracy and System Integration Tests. Therefore, the A300 is included in the recommendation for certification.



Photograph No. 3: AutoMARK™ A200 VAT

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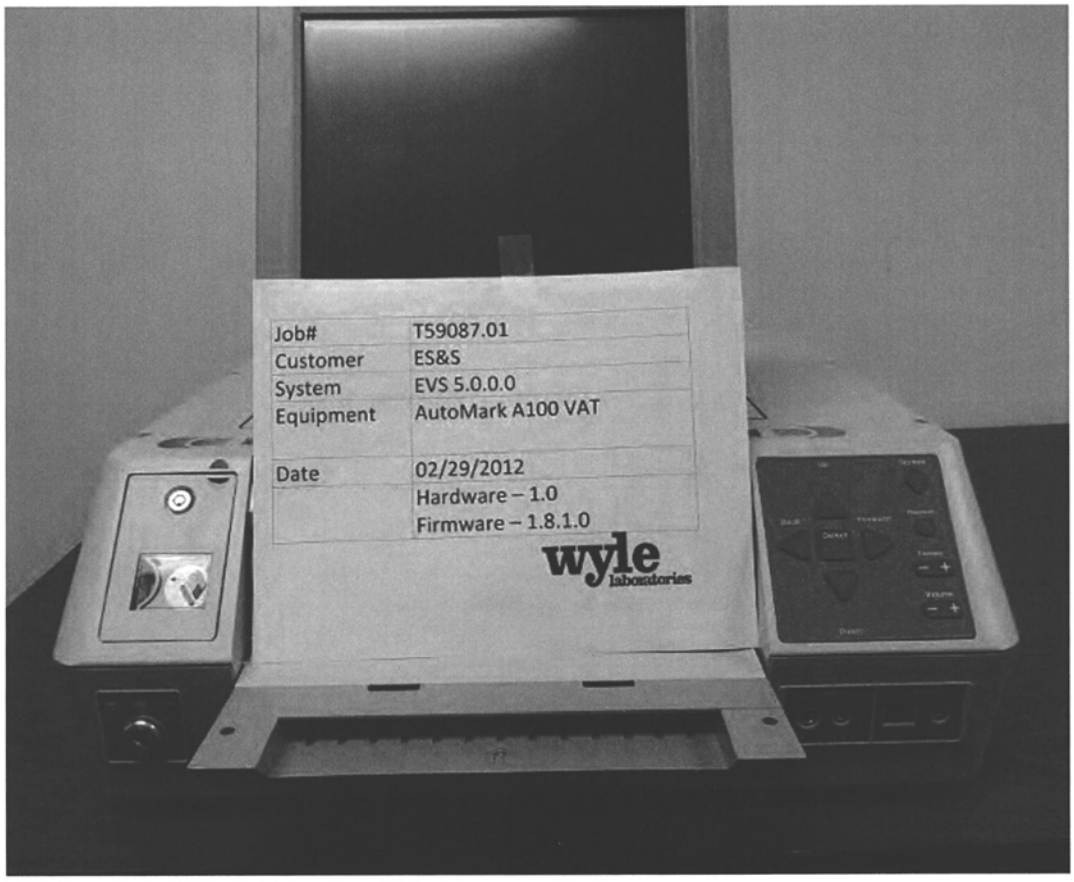

Photograph No. 4: AutoMARK™ A100 VAT

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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. 5: DS850

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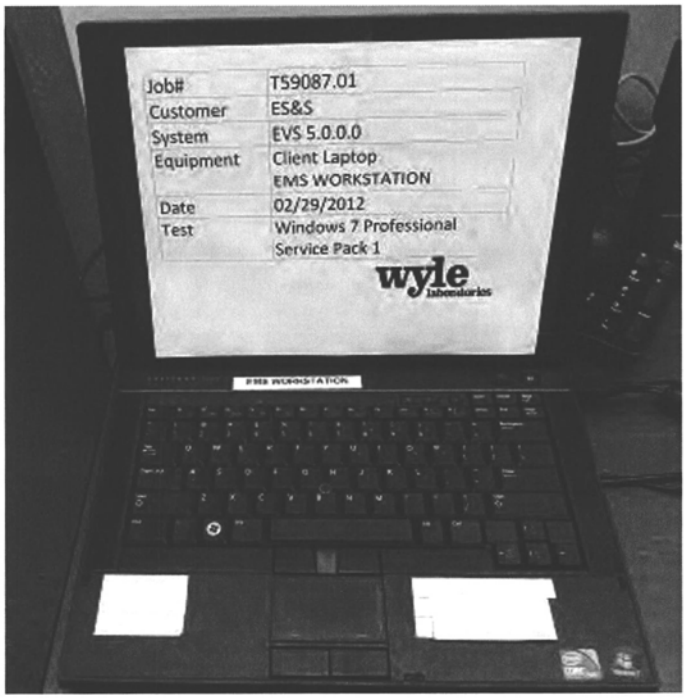
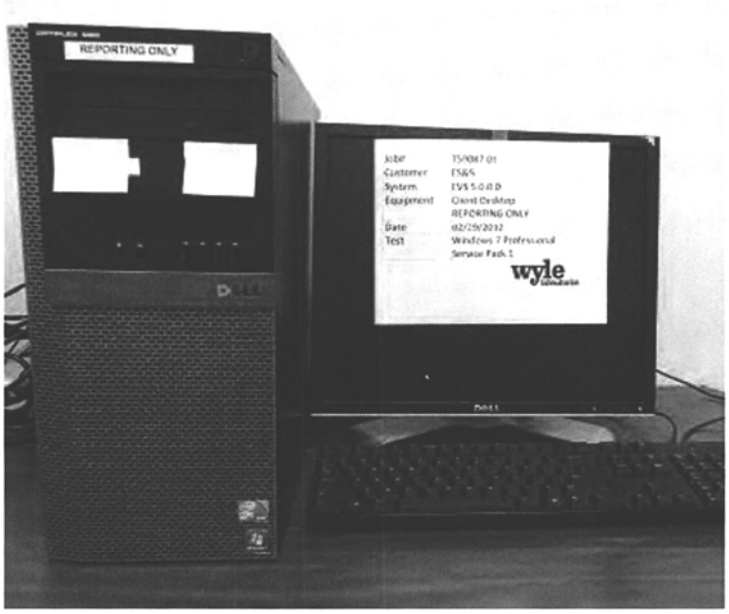
EMS Client Server Configuration

EVS 5.0.0.0 Voting System Election Management System (EMS) was configured with a Server running Windows Server 2008 R2 and a combination of a client laptop and a client desktop running Windows 7 Professional.

Photograph No. 6: EMS Server



Photograph No. 7: EMS Client Laptop



Photograph No. 8: EMS Client Desktop

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2.1.2 System Software

The EVS 5.0.0.0 Voting System EMS is an application suite comprised of five components: ElectionWare, Election Reporting Manager (ERM), Removable Media Service (RMS), ES&S Event Logging Service (UELS), and VAT 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, 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.

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 insertion and removal of election and results USB media.

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.

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.

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2.1.3 System Operational Concept

The operational flow and low-level system interfaces for the EVS 5.0.0.0 Voting System is illustrated in Figure 1-1.

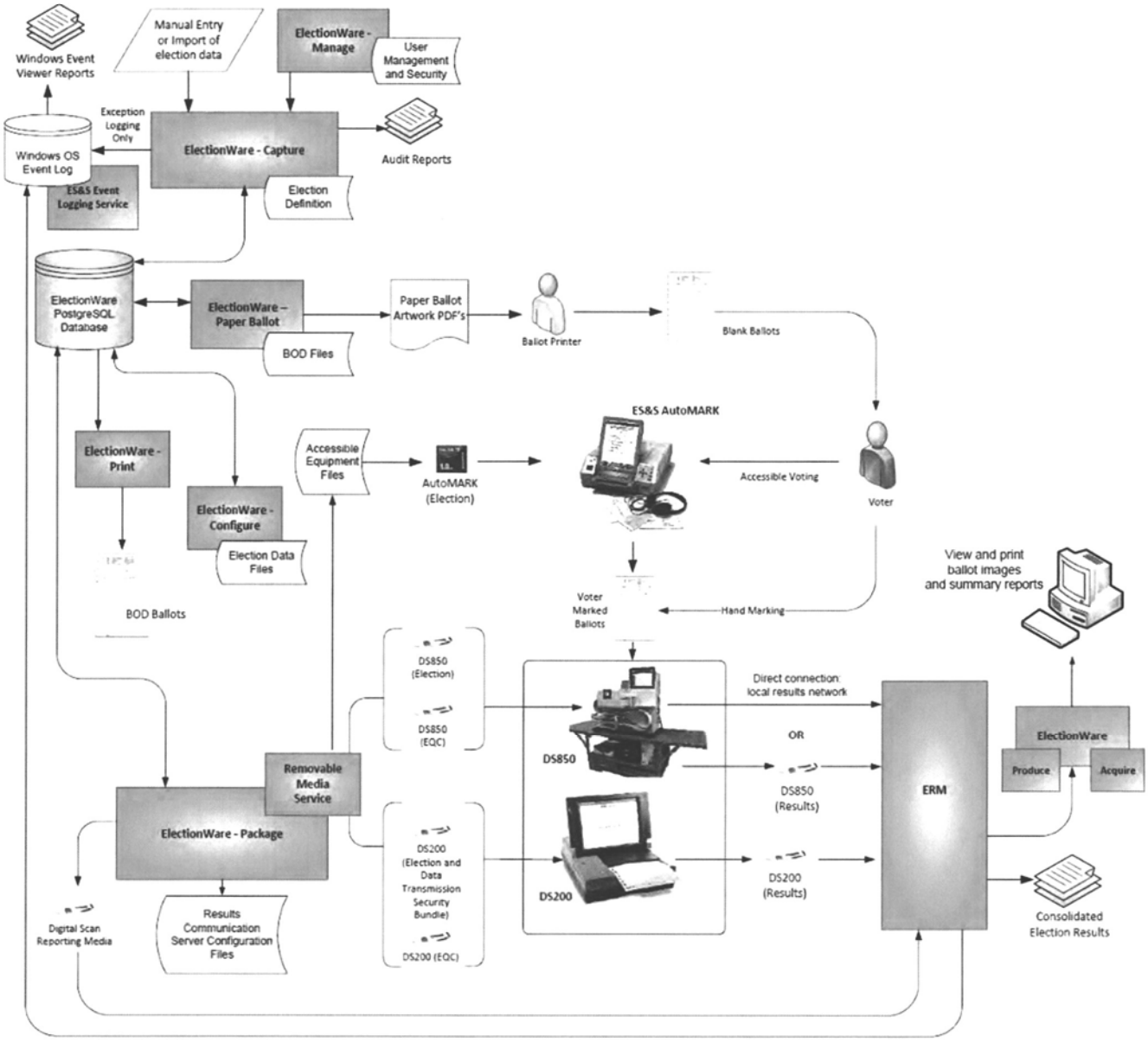

Figure 1-1 System Overview Diagram

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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 Wyle qualified personnel. These products were verified not to have been modified and were built into the EVS 5.0.0.0 for the entire test campaign. Wyle 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 5.0.0.0 EMS Software Platform Component Descriptions

Software Required For Testing	Software Version
ElectionWare	4.1.0.0
Election Reporting Manager (ERM)	8.6.0.0
ES&S Event Logging Service	1.5.0.0
VAT Previewer	1.8.1.0
Removable Media Service	1.4.0.0

Table 2-2 EVS 5.0.0.0 EMS COTS Software Platform Component Descriptions

Software Required For Testing	Description
Windows 7 Professional, with SP1	Original Disk
Windows Server 2008 R2, with SP2	Original Disk
Adobe Acrobat Standard version 9.0 or better	Original Disk
RM/Cobol	12.06
Microsoft Office Excel 2007 or better	Original Disk
Adobe Acrobat Standard 9.0	Original Disk

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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 5.0.0.0 Voting System Equipment Description

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

Table 2-4 Build Machine Description

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

Table 2-5 EVS 5.0.0.0 Voting System Equipment

Equipment	Description	Serial Numbers
AutoMARK	Voting Assist Terminal (A100)	AM0106421217
AutoMARK	Voting Assist Terminal (A100)	AM0106431607
AutoMARK	Voting Assist Terminal (A200)	AM0106431648
AutoMARK	Voting Assist Terminal (A200)	AM0206442952
AutoMARK	Voting Assist Terminal (A200)	AM0206443671
AutoMARK	Voting Assist Terminal (A200)	AM0206443734

2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

2.3 Hardware (Continued)

Table 2-5 EVS 5.0.0.0 Voting System Equipment (Continued)

Equipment	Description	Serial Numbers
AutoMARK	Voting Assist Terminal (A200)	AM0208470626
AutoMARK	Voting Assist Terminal (A200)	AM0208470638
AutoMARK	Voting Assist Terminal (A200)	AM0208470705
AutoMARK	Voting Assist Terminal (A200)	AM0208470828
AutoMARK	Voting Assist Terminal (A300)	AM0307420270
AutoMARK	Voting Assist Terminal (A300)	AM0307430730
AutoMARK	Voting Assist Terminal (A300)	AM0307431421
AutoMARK	Voting Assist Terminal (A300)	AM0308421809
DS200	Precinct Count Digital Scanner	DS0110340034
DS200	Precinct Count Digital Scanner	DS0110340480
DS200	Precinct Count Digital Scanner	ES0108330100
DS200	Precinct Count Digital Scanner	ES0108340085
DS200	Precinct Count Digital Scanner	ES0108340579
DS850	Central Count Digital Scanner	DS8509420009
DS850	Central Count Digital Scanner	DS8509420037
DS850	Central Count Digital Scanner	DS8511090074
DS850	Central Count Digital Scanner	DS8511090075
Ballot Box Hardware v. 1.2,1.3	Plastic Ballot Box	E076, E089, E099, T59087-Box 2, T59087-Box 3, T59087-Box 5
Ballot Box Hardware v. 1.0,1.1,1.2	Metal Box with Diverter	E015, E017, T59087 –Metal Box-12, T59087 – Metal Box-13

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 5.0.0.0 certification testing:

Table 2-6 Test Support Materials

Test Material	Quantity	Make	Model
Ballot on Demand Printer	1	OKI Data	C9650
8 ½" X 11" Paper in Speed Loading Box (2700 Sheets)	4	Dot Matrix	951027
Security Seals	5000	Intab	800-0038R

2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

2.4 Test Tools/Materials (Continued)

Table 2-6 Test Support Materials (Continued)

Test Material	Quantity	Make	Model
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	---	---
Transport Media (USB Flash Drives)	5	Delkin	512 MB Capacity
	10	Delkin	1.0 GB Capacity
	5	Delkin	2.0 GB Capacity
	75	Delkin	4.0 GB Capacity
	5	Delkin	8.0 GB Capacity
Compact Flash	10	SanDisk	1.0 GB Capacity
	10	SanDisk	2.0 GB Capacity
	10	Toshiba	1.0 GB Capacity

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 5.0.0.0 Voting System TDP:

2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

2.5 Vendor Technical Data Package (Continued)

Table 2-7 EVS 5.0.0.0 Voting System TDP

EVS 5.0.0.0 TDP Documents	Version	Doc. No.	Document Code
Voting System Overview	15.0	01-01	EVS5000_OVR00
System Functionality Description			
System Functionality Description – Voting System	8.0	02-01	EVS5000_SFD00
System Hardware Specification			
System Hardware Specification – DS850	3.0	03-01	EVS5000_SHS00_DS850
System Hardware Specification – DS200	2.0	03-02	EVS5000_SHS00_DS200
AutoMARK™ System Hardware Overview	5.0	03-04	AutoMARK™_ESS_System_Hardware_Overview_AQS-18-5002-000-S
AutoMARK™ System Hardware Specification	5.0	03-05	AutoMARK™_ESS_System_Hardware_Specification_AQS-18-5000-001-F
Software Design and Specification			
Software Design and Specification – ES&S Event Logging Service	1.0	04-01	EVS5000_SDS00_UELS
Software Design and Specification - ElectionWare	7.0	04-02	EVS5000_SDS00_ElectionWare
Software Design and Specification – ERM	3.0	04-03	EVS5000_SDS00_ERM
Software Design and Specification – DS850	10.0	04-04	EVS5000_SDS00_DS850
Software Design and Specification – DS200	7.0	04-05	EVS5000_SDS00_DS200
Software Design and Specification – AutoMARK™	1.8	04-06	EVS5000_SDS00_AutoMARK™ SDS Overview
System Development Program	1.0	04-07	ESSSYS_SG_P_1000_SystemDevProgram
ES&S Standards and Procedure Coding Standards	1.0	04-08	ESSSYS_D_D_0100_Coding Standards
System Test/Verification Specification			
Voting System Test Plan	4.0	05-01	EVS5000_STP00
Test Cases - ElectionWare: Manage	4.1.0.0	05-02	EVS5000_TC00_ElectionWare01_Manage
Test Cases - ElectionWare: Define	4.1.0.0	05-03	EVS5000_TC00_ElectionWare02_Define
Test Cases - ElectionWare: Design	3.3	05-04	EVS5000_TC00_Electionware03_Design
Test Cases - ElectionWare: Deliver	4.1.0.0	05-05	EVS5000_TC00_Electionware04_Deliver
Test Cases - ElectionWare: Resolve	4.2.0.0	05-06	EVS5000_TC00_Electionware05_Resolve
Test Cases - ERM	8.6.0.0	05-07	EVS5000_TC00_ERM
Test Cases - DS850	2.4.0.0	05-08	EVS5000_TC00_DS850
Test Cases - DS200	2.7.0.0	05-09	EVS5000_TC00_DS200
Test Cases - AutoMARK™	1.8.1.0	05-10	EVS5000_TC00_AutoMARK™

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2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

2.5 Vendor Technical Data Package (Continued)

Table 2-7 EVS 5.0.0.0 Voting System TDP (Continued)

EVS 5.0.0.0 TDP Documents	Version	Doc. No.	Document Code
System Security Specification			
System Security Specification	3.1	06-01	EVS5000_SSS00
AutoMARK™ System Security Specifications	6.0	06-02	AutoMARK™ ESS System Security Specification AQS-18-5002-001-S
System Operations Procedure			
System Operations Procedures - UELS	1.0	07-01	EVS5000_SOP00_ELS
User's Guide- ElectionWare Admin	4.8	07-02	EVS5000_SOP00_ElectionWare02_Admin
User's Guide- ElectionWare Define	4.0	07-03	EVS5000_SOP00_ElectionWare02_Define
User's Guide - ElectionWare Design	3.2	07-04	EVS5000_SOP00_ElectionWare03_Design
User's Guide - ElectionWare Deliver	5.6	07-05	EVS5000_SOP00_ElectionWare04_Deliver
User's Guide - ElectionWare Results	1.5	07-06	EVS5000_SOP00_ElectionWare05_Results
User's Guide - ERM	8.6	07-07	EVS5000_SOP00_ERM
Operator's Guide - DS850	11.4	07-08	EVS5000_SOP00_DS850
Operator's Guide - DS200	10.1	07-09	EVS5000_SOP00_DS200
System Operations Procedures - AutoMARK™	5.0	07-10	EVS5000_SOP00_AMVAT
Network Configuration Guide	3.1	07-12	EVS5000_SOP00_NetworkConfigGuide
System Maintenance Manuals			
Maintenance Guide- DS850	3.1	08-01	EVS5000_SMM00_DS850
Maintenance Guide- DS200	3.1	08-02	EVS5000_SMM00_DS200
Maintenance Guide- AutoMARK™	4.0	08-03	EVS5000_SMM00_AMVAT
Personnel Deployment and Training			
Personnel Deployment and Training Program	1.0	09-01	ESSSYS_T_D_1000_TrainingProgram
Configuration Management Plan			
ES&S Configuration Management Program	1.0	10-1	ESSSYS_CM_P_1000_ESSCMProgram
CM Plan Appendices	---	10-2	Multiple Documents
QA Program			
Manufacturing Quality Assurance Plan	1.0	11-01	ESSSYS_M_P_1000_MNFQualityAssurancePlan
Engineering Change Order Process	1.0	11-02	ESSSYS_M_P_0500_ECOProcess
Software Quality Assurance Program	1.0	11-03	ESSSYS_Q_P_0100_SoftwareQualityAssuranceProgram
Other TDP Documents			
ES&S Ballot Production Guide	4.0	13-01	U3400R1_ORPT02_BallotProductionGuide

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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 5.0.0.0 Voting System to the end users.

Table 2-8 EVS 5.0.0.0 Voting System Deliverables

Deliverable Material	Version	Description
ERM	8.6.0.0	EMS
ElectionWare	4.1.0.0	EMS
ES&S Event Logging Service	1.5.0.0	EMS
Removable Media Services	1.4.0.0	EMS
VAT Previewer	1.8.1.0	EMS
DS200	Firmware 2.7.0.0; Hardware 1.2	Precinct ballot scanner
AutoMARK™ A100	Firmware 1.8.1.0; Hardware 1.0	Voter Assist Terminal
AutoMARK™ A200	Firmware 1.8.1.0; Hardware 1.1, 1.3	Voter Assist Terminal
AutoMARK™ A300	Firmware 1.8.1.0; Hardware 1.3	Voter Assist Terminal
DS850	Firmware 2.4.0.0; Hardware 1.0	Central ballot scanner
OKI Printer	B430dn, B431dn	Laser Report Printer
OKI Printer	Microline 420	Dot Matrix Printer
Headphones	Avid FV 60	Stereo headphones
Voting System Overview EVS 5.0.0.0	15.0	TDP Document
ES&S ElectionWare 4.1 Vol. I: Administrator's Guide	4.8	TDP Document
ES&S ElectionWare 4.1 Vol. II: Define User's Guide	3.8	TDP Document
ES&S ElectionWare 4.1 Vol. III: Design User's Guide	3.2	TDP Document
ES&S ElectionWare 4.1 Vol. IV: Deliver User's Guide	5.6	TDP Document
ES&S ElectionWare 4.1 Vol. V: Results User's Guide	1.5	TDP Document
ES&S DS200 System Operations Procedures	10.1	TDP Document
ES&S DS850 System Operations Procedures	2.4	TDP Document
AutoMARK™ system Operations Procedures	5.0	TDP Document
ES&S ERM System Operations Procedures	8.6	TDP Document
Network Configuration Guide	3.1	TDP Document
EVS Event Logging Service System Operations Procedures	1.0	TDP Document
Voting System Security Specification EVS 5.0.0.0	3.1	TDP Document
Jurisdiction Security Practices Template	1.0.0.1	TDP Document
Hardening the EMS PC Guide	4.0	TDP Document

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2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

2.7 End User Documentation

The following documents constitute the deliverables to the end user at election central:

- Voting System Overview EVS 5.0.0.0, Version 15.0
- ES&S ElectionWare 4.1 Vol. I: Administrator's Guide, Revision 4.8
- ES&S ElectionWare 4.1 Vol. II: Define User's Guide, Revision 4.0
- ES&S ElectionWare 4.1 Vol. III: Design User's Guide, Revision 3.2
- ES&S ElectionWare 4.1 Vol. IV: Deliver User's Guide, Revision 5.6
- ES&S ElectionWare 4.1 Vol. V: Results User's Guide, Revision 1.5
- ES&S DS200 System Operations Procedures, Revision 10.1
- ES&S DS850 System Operations Procedures, Revision 2.4
- AutoMARK™ System Operations Procedures, Revision 5.0
- ES&S ERM System Operations Procedures, Revision 13.1
- Network Configuration Guide, Revision 3.1
- EVS Event Logging Service System Operations Procedures, Revision 1.0
- Voting System Security Specification EVS 5.0.0.0, Revision 3.1
- Personnel Deployment and Training, Revision 1.0

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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)

3.1 General Information

All testing performed as part of the test effort was performed at the Wyle Laboratories' Huntsville, Alabama facility with the exception of the DS200 and AutoMARK Product Safety Review which was performed by a third party test laboratory at the location listed below. DS850 Product Safety Review was performed by Wyle Laboratories for iBeta as part of the Unity 5.0.0.0 Certification Effort. Certification testing included: the inspection and evaluation of voting system documentation, tests of voting system under conditions simulating the intended storage, operation, transportation, and maintenance environments; and operational tests verifying system performance and function under normal and abnormal conditions. Qualification/Certification testing was limited to the ES&S EVS 5.0.0.0 Voting System, which includes items listed in Section 2 of this report.

The DS200 and AutoMARK Product Safety Reviews were performed by the following NRTL and OSHA certified laboratory and all testing was witnessed onsite by Wyle Laboratories:

MET Laboratories, Inc.
Safety Certifications
901 Sheldon Drive
Cary, NC 27513

3.2 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 "Wyle Baseline Test Cases" along with test cases specially designed for the ES&S EVS 5.0.0.0. The data input during these tests consisted of the predefined election definitions as contained in Appendix A.6 of this report.
- **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 "Wyle Baseline Test Cases" and the "Wyle Baseline Usability Test Cases." The data input during this test consisted of the predefined election definitions contained in Appendix A.6 of this report.
- **Section 4: Hardware Requirements** – The requirements in this section were tested by trained Wyle 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 Testing Scope (Continued)

- **Section 6: Telecommunication** – The requirements in this section only apply to the EMS components and the DS850. They were tested in FCA, System Integration, and Accuracy
- **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 requirements in this section were tested throughout the test campaign via various methods. TDP review was performed on the ES&S QA documentation to determine compliance to EAC 2005 VVSG requirements and the requirements stated in the ES&S QA Program document. All source code was checked to ensure that proper QA documentation had been completed. All equipment received for initial testing and follow up testing was checked against ES&S documentation to ensure their QA process is being followed.
- **Section 9: Configuration Management (CM) Requirements** – The requirements in this section were tested throughout the test campaign. TDP review was 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. During source code review, Wyle qualified personnel verified that ES&S was following EAC 2005 VVSG CM requirements as well as ES&S CM requirements. All equipment received for initial testing and follow up testing was checked against ES&S documentation to ensure their CM process is being followed.

The ES&S EVS 5.0.0.0 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 5.0.0.0 Voting System to the requirements contained in the indicated sections of the EAC 2005 VVSG is described in Table 3-1.

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3.0 TEST BACKGROUND (Continued)

3.2 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 5.0.0.0 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 5.0.0.0 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 5.0.0.0 Voting System.
7.9	The ES&S EVS 5.0.0.0 Voting System is a paper based system.

3.3 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).

3.4 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.

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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 5.0.0.0 Voting System, the EMS is comprised of five components: ElectionWare, ERM, ES&S Event Logging 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.

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3.0 TEST BACKGROUND (Continued)

3.5 Terms and Abbreviations (Continued)

Table 3-2 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. A witnessed build of the executable system is performed to ensure the certified release is built from tested components.
Quality Assurance	QA	--
Regression Testing	n/a	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.
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.
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.
Wyle Laboratories, Inc.	Wyle	---
Wyle Operating Procedure	WoP	Wyle Test Method or Test Procedure.
Voting System Test Laboratory	VSTL	Wyle Labs.
Voluntary Voting System Guidelines	VVSG	EAC Voluntary Voting System Guidelines V. 1.0.

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4.0 TEST FINDINGS AND RECOMMENDATIONS

The ES&S EVS 5.0.0.0 Voting System, as identified in Section 2 of this report, was subjected to the tests as summarized in the following paragraphs.

4.1 Source Code Review

As part of the testing activities, the ES&S EVS 5.0.0.0 Voting System received a 100% source code review to the EAC 2005 VVSG coding standards and the manufacturer supplied coding standards. The manufacturer supplied coding standards (ESSSYS_D_D_0100_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 SHA1 hash value was created for each source code file. The source code team then conducted a visual scan of every line of modified source code. 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. The Source Code Review Report that summarizes the discrepancies noted is included in Appendix A.8 of this report. The Notice of Anomaly (NOA No. 18) documenting that source code discrepancies were found is included in Appendix A.1 of this report.

4.2 Witnessed Build

A Witnessed 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

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.2 Witnessed Build (Continued)

- 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 "Trusted Build" for the ES&S EVS 5.0.0.0 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 SHA1 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. The Microsoft Windows XP Professional 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.

Summary Findings

Wyle performed a Witnessed Build for each software component of the ES&S EVS 5.0.0.0 on March 3-8, 2013. ES&S Technical Representative for the Witnessed Build was Dave Herrera. The products from the Witness Build shall be supplied to the EAC as part of the certification effort. The detailed steps followed during the performance of the Witnessed Build are presented in Appendix C.

4.3 Technical Data Package Review

The ES&S EVS 5.0.0.0 Voting System Technical Data Package (TDP) was reviewed to the VVSG. This review was performed as part of the pre-testing activities. The documents included in the TDP review are listed in Section 2.5 of this document.

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. Functional testing also identified text in the TDP that conflicted with the actual operation of the system. These discrepancies were reported to ES&S and tracked as test exceptions until verified that the applicable documents had been corrected.

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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. 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.

- Documents that were not included in the submitted TDP package were referenced for information.
- Some descriptive information included was inconsistent with descriptions in other TDP documents.
- Placeholders within some of the documents indicated information was not yet inserted.
- Not all VVSG requirements were initially addressed in some of the documents.
- 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 discrepancies noted is included in Appendix A.7 of this report. The Notice of Anomaly (NOA No. 17) documenting that TDP discrepancies were found is included in Appendix A.1 of this report.

4.4 QA and CM System Review

The ES&S QA Plan and CM Plan were reviewed to determine compliance with EAC 2005 VVSG Volume I Sections 8 and 9 and Volume II Sections 2 and 7 requirements, and with the requirements of the internal ES&S documentation. Also, the ES&S Technical Data Package was reviewed to determine if the ES&S QA Plan and the CM Plan were being followed.

Summary Findings

Wyle conducted a remote audit of ES&S QA Program, during which Wyle requested artifacts from ES&S' documented QA Program. Wyle provided ES&S an artifact checklist targeting the following areas:

- Pre-Product Development
- Product Change Management
- Fielded Products and Manufacturing

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.4 QA and CM System Review (Continued)

Summary Findings (Continued)

ES&S was allowed an 8-hour business day to provide the requested artifacts. Wyle reviewed the received artifacts against the ES&S documented procedures. Wyle accepted all of the artifacts received during this audit as meeting the stated process and procedures in the ES&S QA & CM Plan.

4.5 Hardware Testing

Hardware testing included: the inspection and evaluation of voting system documentation; tests of voting system under conditions simulating the intended storage, operation, transportation, and maintenance environments; and operational tests verifying system performance and function under normal and abnormal conditions. Hardware testing was limited to the EVS 5.0.0.0 Voting System.

Table 4-1 VVSG Test Requirements

REPORT SECTION	VVSG VOL. I SECTION	VVSG VOL. II SECTION	TEST DESCRIPTION
4.3		2.1	Technical Data Package Review
4.6.1		4.6.4	Low Temperature Test
4.6.1		4.6.5	High Temperature Test
4.6.1		4.6.3	Vibration Test
4.6.1		4.6.2	Bench Handling Test
4.6.1		4.6.6	Humidity Test
4.6.2		4.7.1	Temperature/Power Variation Test
4.6.2	3.2.2.2		Acoustic Noise Level Test
4.7.1	4.1.2.5	4.8A	Electrical Power Disturbance Test
4.7.2	4.1.2.9	4.8B	Electromagnetic Radiation Test
4.7.3	4.1.2.8	4.8C	Electrostatic Disruption Test
4.7.4	4.1.2.10	4.8D	Electromagnetic Susceptibility Test
4.7.5	4.1.2.6 (a)	4.8E	Electrical Fast Transient Test
4.7.6	4.1.2.7 (a) (b)	4.8F	Lightning Surge Test
4.7.7	4.1.2.11 (a)	4.8G	Conducted RF Immunity Test
4.7.8	4.1.2.12	4.8H	Magnetic Fields Immunity Test
4.7.9	4.3.8		Product Safety Review, UL60950-1*
4.7.10	4.1.2.4		Electrical Supply
4.7.11		4.7.2	Maintainability Test

*Safety testing was witnessed by Wyle at a third party laboratory

4.6 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.

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.6 Environmental Tests (Continued)

4.6.1 Non-Operating Environmental Tests (Continued)

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.

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 Low Temperature Test Chamber Circular Chart and Instrumentation Equipment Sheet are contained in the Hardware Test Report Appendix A.2.

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 High Temperature Test Chamber Circular Chart and Instrumentation Equipment Sheet are contained in the Hardware Test Report Appendix A.2.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.6 Environmental Tests (Continued)

4.6.1 Non-Operating Environmental Tests (Continued)

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 I, with a frequency range from 10 to 500 Hz and an overall rms level of 1.04, 0.74, and 0.20 G for duration of 30 minutes in each orthogonal axis.

The vibration test for the DS200 was repeated four times. Upon each test completion, the DS200 was inspected for any obvious signs of degradation and/or damage. Inspections after the first three runs revealed parts that had become loose or were freely moving. The DS200 successfully completed the requirements of the Vibration Test on the fourth attempt. Notices of Anomaly 1, 2, 3, and 4 can be found in Appendix A.1 of this test report. Additional details of each anomaly are in section 4.9 Anomalies and Resolutions. The Vibration Test Data Sheets and Instrumentation Equipment Sheet are contained in the Hardware Test Report Appendix A.2.

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 Bench Handling Data Sheet and Instrumentation Equipment Sheet are contained in the Hardware Test Report Appendix A.2.

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.6 Environmental Tests (Continued)

4.6.1 Non-Operating Environmental Tests (Continued)

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. For a full description of the Humidity Test Data see the Hardware Report in Appendix A.2.

Upon test completion, the EUT was inspected for any obvious signs of degradation and/or damage. It was discovered that the AutoMARK A100 failed to function properly during the Post Operating Status Check. On the second attempt the AutoMARK A100 successfully completed the requirements of the Humidity Test. Notices of Anomaly 5, 6, and 13 can be found in Appendix A.1 of this test report. Additional details of each anomaly are in section 4.9 Anomalies and Resolutions. The Chamber Circular Chart and Instrumentation Equipment Sheet for the test are presented in the Hardware Test Report Appendix A.2.

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.6 Environmental Tests (Continued)

4.6.2 Operating Environmental Tests

Temperature/Power Variation Test

The EUT 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 total cumulative duration of the test was at least 163 hours, 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. Two DS200 units were configured to scan 100 ballots per hour, while two AutoMark units were configured to mark 1 ballot an hour. Additionally, two DS850 units were configured to scan 300 ballots per hour. 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 2-3 through 2-6). During test performance, the operational functions were continuously exercised by the scanning of ballots and the marking of ballots via audio voting. At the conclusion of the Temperature and Power Variation Test all ballots produced via the AutoMARK during the test were then processed by casting the ballots through the DS200 and the DS850. All 170 ballots were tabulated and all results were verified and validated to be accurate.

Summary Findings

The Temperature/Power Variation Test was restarted a total of three times. Three anomalies were identified during this test and ES&S addressed these issues from the hardware prospective. Notices of Anomaly 11, 12, and 14 can be found in Appendix A.1 of this test report. Additional details of each anomaly are in section 4.9 Anomalies and Resolutions. At the conclusion of the successful run, operational status checks were performed resulting in the EUTs successfully completing the requirements of the Temperature/Power Variation, Data Accuracy, and Reliability Tests.

Hardware Test Report Appendix A.2 contains the Temperature/Power Variation data.

Acoustic Noise Level Test

The EUT was subjected to an Acoustic Noise Level Test to satisfy the following requirements of Section 3.2.2.2 (c) of Volume I of the 2005 VVSG:

Section 3.2.2.2 (c) of Volume I of the 2005 VVSG

v. The voting machine shall set the initial volume for each voter between 40 and 50 dB SPL.

vi. The voting machine shall provide a volume control with an adjustable volume from a minimum of 20 dB SPL up to a maximum of 100 dB SPL, in increments no greater than 10 dB.

vii. The audio system shall be able to reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.6 Environmental Tests (Continued)

4.6.2 Operating Environmental Tests (Continued)

Summary Findings

During the performance of this test two anomalies were identified. Both the A100 and A200 failed to reach the maximum 100 dB SPL and ES&S addressed these issues from a firmware prospective. Notices of Anomaly 9 and 10 can be found in Appendix A.1 of this test report. Additional details of each anomaly are in section 4.9 Anomalies and Resolutions. The test was repeated successfully for only the maximum dB SPL levels for both the A100 and A200.

Hardware Test Report Appendix A.2 contains the Acoustic Noise Level test data.

4.7 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 electrical tests for the EVS 5.0.0.0 Voting System were performed during prior test campaigns. The test data is contained in the Hardware Test Report Appendix A.2.

4.7.1 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 the Hardware Test Report Appendix A.2.

4.7.2 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 FCC Part 15, Class B emissions. 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 found to comply with the required emissions limits. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in the Hardware Test Report Appendix A.2.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.7 Electrical Tests (Continued)

4.7.3 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. 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.

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

The EUT successfully met the requirements of the Electrostatic Disruption Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in the Hardware Test Report Appendix A.2.

4.7.4 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 EUT was then subjected to ambient electromagnetic fields at 10 V/m over a range of 80 MHz to 1000 MHz.

There was no loss of normal operation or loss of data as a result of the applied electromagnetic fields.

The EUT successfully met the requirements of the Electromagnetic Susceptibility Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in the Hardware Test Report Appendix A.2.

4.7.5 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.

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 the Hardware Test Report Appendix A.2.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.7 Electrical Tests (Continued)

4.7.6 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 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.

The EUT successfully met the requirements of the Lightning Surge Test. The Test Data Sheet, Photographs, and Instrumentation Equipment Sheet are contained in the Hardware Test Report Appendix A.2.

4.7.7 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.

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 the Hardware Test Report Appendix A.2.

4.7.8 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 the Hardware Test Report Appendix A.2.

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.7 Electrical Tests (Continued)

4.7.9 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".

Hardware Test Report Appendix A.2 contains the Product Safety Review data.

4.7.10 Electrical Supply Testing

Components of voting systems that require an electrical supply shall meet the following standards:

Precinct count voting systems shall operate with the electrical supply ordinarily found in polling places (Nominal 120 Vac/60Hz/1 phase).

Central count voting systems shall operate with the electrical supply ordinarily found in central tabulation facilities or computer room facilities (Nominal 120 Vac/60Hz/1, nominal 208 Vac/60Hz/3 or nominal 240 Vac/60Hz/2).

All voting machines shall also be capable of operating for a period of at least 2 hours on backup power, such that no voting data is lost or corrupted nor normal operations interrupted. When backup power is exhausted the voting machine shall retain the contents of all memories intact.

The AutoMARK and DS850 successfully completed the requirements of the Electrical Supply Test. However, the DS200s did not meet the initial 2 hour minimum requirement. Two anomalies (1 per each DS200) were identified. Notices of Anomaly 7 and 8 can be found in Appendix A.1 of this test report. Additional details of each anomaly are in section 4.9 Anomalies and Resolutions. The test was repeated successfully on the DS200s after ES&S addressed these issues from a firmware prospective.

Hardware Test Report Appendix A.2 contains the Electrical Supply Test data.

4.7.11 Maintainability

All maintenance required actions listed in the TDP were performed by Wyle Laboratories personnel to determine the ability to perform the actions required.

The AutoMARK, DS200, and DS850 successfully completed the requirements of the Maintainability Test.

4.8 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 5.0.0.0 Voting System as well as the tested values and the test performed to verify each limit are compiled in Table 4-2.

Table 4-2 EVS 5.0.0.0 System Limits

Limit (Maximum Number of)	Declared Value	Tested Value	Test Performed
Precincts in Election	9,900	9,900	Volume and Stress
Contests in Election	21,000	21,000	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	65,500	65,500	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.**

An overview of the suite of tests performed during System Level Testing is provided in the following paragraphs, along with the summary findings of each test.

4.8.1 Volume and Stress Test

The EVS 5.0.0.0 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-F contained in Table 4-3 of this document).

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.1 Volume and Stress Test (Continued)

Table 4-3 EVS 5.0.0.0 Volume and Stress

Voting Pattern	"Test Decks" were created for each election definition: **<u>Election A</u>:** **LIMITS TESTED:** ▪ Maximum Precincts in an election (9900) ▪ Maximum Ballot Styles in an Election (9900) ❑ **DS200 Test Deck: 584 Ballots** ▪ Test deck consisted of first 500 precincts then every 100th ballot starting at precinct 600 and ending at 9900. Even precincts voted for candidate 1 and odd precincts voted for write in ❑ **DS850 Test Deck: 9900 Ballots** ▪ Test deck consisted of precincts 1 to 9900, even precincts voted for candidate 1 and odd precincts voted for write in ❑ **AutoMARK: First five precincts loaded in AutoMARK** ▪ Voted each contest on ballot **<u>Election B:</u>** **Limits Tested:** ▪ Maximum Precinct Elements Tabulator (65,500) ▪ Maximum Precinct Elements ERM (500,000) ▪ **Test Deck: All Fill Ballot with 6 contests that each consist of a Vote for 82** ▪ 1st oval in each contest is filled, all others are left blank ❑ **DS200 Test Deck: 1 ballot per pass** ▪ Run in Admin Mode ▪ 8 total passes: Passes 1-7, 809 times; Pass 8, 510 times ▪ Reports configured to include Over/Under reporting ▪ Passes 1-7 will increment UNDERVOTES for each contest by 65,529 on each pass (81 x 809 = 65,529) ▪ On pass 8, total UNDERVOTE value will reach 500,013 (65,529 x 7) + (81 x 510) = 500,013 ❑ **DS850 Test Deck: 100 ballots** ▪ Run the test deck eight times, twice in each orientation, and then one run of nine ballots from the test deck for a total of 809. ▪ Export to USB, clear results and repeat seven more times, (saving each run on separate USB) with the eighth run consisting of 510 ballots. ❑ **AutoMARK: Marked first candidate in each contest on a ballot**

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.1 Volume and Stress Test (Continued)

Table 4-3 EVS 5.0.0.0 Volume and Stress (Continued)

Voting Pattern	**Election C:** **Limits Tested:** ▪ Maximum candidate counters/election (21,000) ▪ Maximum contests allowed in an election (21,000) ▪ Maximum candidates/contest (175) ▪ Maximum "Vote for"/contest (98) ▪ Maximum number of parties in a General Election **(75)** ❑ **DS200 & DS850 Test Deck: 156 ballots (One ballot for each ballot style in election)** ▪ Every EVEN candidate POSITION of each contest was marked with the exception of contest ten in which the first 12 candidates, the last 10 candidates and every other candidate in between was marked to confirm a "vote for 98" ❑ **AutoMARK Test Deck: Marked 15 randomly selected ballots** **Election D:** **Limits Tested:** ▪ Maximum number of parties in a Primary Election (20 including nonpartisan party) ❑ **DS200 & DS850 Test Deck: 20 Ballots (One ballot for each party)** ▪ Each candidate was marked ▪ Test deck ran four times, once in each orientation ▪ All candidates received four votes ❑ **AutoMARK Test Deck: 20 ballots** ▪ Each candidate was marked **Election E:** **Limits Tested:** ▪ Maximum district types (20) ▪ Maximum district names (40) ❑ **DS200 & DS850 Test Deck: 40 ballots (One for each district name)** ▪ Each candidate was marked ▪ Test deck ran four times, once in each orientation ▪ All candidates received four votes ❑ **AutoMARK Test Deck: One ballot** ▪ Each candidate was marked

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.1 Volume and Stress Test (Continued)

Table 4-3 EVS 5.0.0.0 Volume and Stress (Continued)

Voting Pattern	**Election F:** **Limits Tested:** ▪ Maximum candidate\counters allowed per precinct (1,000) ▪ Maximum contests allowed per ballot style (200 or ballot positions) ❑ **DS200 & DS850 Test Deck: 1 ballot (200 contests)** ▪ Odd races voted for candidate 1 and even races voted for write in ▪ Test deck ran four times, once in each orientation ▪ Odd races candidate 1 receives four votes and even races write in receives four votes ❑ **AutoMARK Test Deck: One ballot** ▪ Candidate 1 marked on odd races, and write in marked on even races

Table 4-4 EVS 5.0.0.0 Volume and Stress Ballots Cast

Total Ballots Cast

System	Ballots Cast Per Election						Machines in Test	Total Ballots Cast
	A	B	C	D	E	F		
DS200	584	6173	156	80	160	4	1	7,157
DS850	9900	6173	156	80	160	4	1	16,473
AutoMARK	5	1	15	20	1	1	1	43
							Total	23,673

Summary Findings

At the conclusion of the Volume and Stress Test, the DS200, DS850, and AutoMARK units successfully exercised the stated system limits. There was one (1) each DS200, DS850, and AutoMARK component used for the duration of Volume and Stress performance. A total of 23,673 ballots were processed without issue upon the completion of the test. There were two anomalies noted during testing and the test was restarted from the beginning on each occurrence. Notices of Anomaly 15 and 16 can be found in Appendix A.1 of this test report. Additional details of each anomaly are in section 4.9 Anomalies and Resolutions.

4.8.2 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 a precinct count unit as described in the ES&S-submitted TDP for the EVS 5.0.0.0 Voting System. To perform the System Integration Testing, Wyle developed specific procedures and test cases designed to test the system as a whole. These procedures demonstrated compliance of the EVS 5.0.0.0 Voting System to Sections 2, 3, 4, 5, and 6 of Volume I of the VVSG.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.2 System Integration Test (Continued)

The six election definitions exercised during the System Integration Testing are listed below and are presented in Appendix A.6 for further reference:

- 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. The individual requirements can be traced to the Requirements Matrix contained in Appendix E.

4.8.3 Security Test

The EVS 5.0.0.0 was subjected to Security Testing in accordance with the requirements of Section 7 of Volume I and Section 6.4 of Volume II of the VVSG. The purpose of the Security Test was to verify that security technologies implemented in the EVS 5.0.0.0 to secure the hardware, software, and storage media during pre-voting, voting, and post-voting activities perform as documented in the ES&S-supplied technical documentation and that it meets the requirements of the VVSG.

The Security Test was performed by running a security test suite to provide verification of the access controls and the physical controls documented by ES&S and to gather the necessary information for analysis by Wyle's security professional who holds CEH, CISSP, and CHFI certifications.

Summary Findings

After the initial security test findings were reported to ES&S, they supplied Wyle with an updated System Security Specification document. Wyle reviewed the document and an analysis was performed on the EMS desktop configured as documented by ES&S. Attempts were made to access certain functions of the EMS by users that did not have permissions to access those functions. Those attempts were unsuccessful.

In addition, security tie straps and tamper evident seals were provided and documented for the DS200, DS850, and AutoMARK hardware. The security tie straps/tamper evident seals and their documented installation were analyzed and found to be adequate. The test procedures followed during the Security Test are documented in the Security Test Case Procedure Specification presented in Appendix A.4 of this report. Wyle has determined EVS 5.0.0.0 to be compliant with the security requirements of the EAC 2005 VVSG. The security assessment report can be found in Appendix A.10 of this report.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.4 Usability and Accessibility Test

The EVS 5.0.0.0 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 conformance to the usability and accessibility requirements in the EAC 2005 VVSG.

Conformance to these requirements should result in an improved quality of 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 to Wyle for review and is included in Appendix A.12 of this report.

Summary Findings

The EUT successfully met the requirements of the Usability and Accessibility Tests. The test cases performed and the procedures followed during the Usability and Accessibility Tests are documented in the Usability Test Case Procedure Specification presented in Appendix A.5 of this report. There were no notices of anomaly created as a result of these tests.

4.8.5 Data Accuracy Test

The EVS 5.0.0.0 Voting System was subjected to a Data Accuracy Test in accordance with the requirements of Section 4.7.1.1 of Volume II of the VVSG.

Per the EAC 2005 VVSG, data accuracy is defined in terms of ballot position error rate. This rate applies to the voting functions and supporting equipment that capture, record, store, consolidate, and report the selections (or absence thereof) made by the voter for each ballot position. To meet the requirements of this test, the voting system must be subjected to the casting of a large number of ballots to verify vote recording accuracy, i.e., at least 1,549,703 ballot positions correctly read and recorded.

Tables 4-6 to 4-8 show the breakdown of how many ballots of the different sizes were run during the accuracy test.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.5 Data Accuracy Test (Continued)

Table 4-5 EVS 5.0.0.0 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	50	15	35	392	3	5	294,000	750
14 inch	50	15	35	512	3	5	384,000	750
17 inch	50	15	35	640	3	5	480,000	750
19 inch	50	15	35	720	3	4	432,000	600
Total	**200**	**60**	**140**	**N/A**	**N/A**	**19**	**1,590,000**	**2850**

Table 4-6 EVS 5.0.0.0 Accuracy DS850

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	50	15	35	392	2	7	274,400	700
14 inch	50	15	35	512	2	7	358,400	700
17 inch	50	15	35	640	2	7	448,000	700
19 inch	50	15	35	720	2	7	504,000	700
Total	**200**	**60**	**140**	**N/A**	**N/A**	**28**	**1,584,800**	**2800**

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4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.5 Data Accuracy Test (Continued)

Table 4-7 EVS 5.0.0.0 Accuracy AutoMARK

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	40	N/A	N/A	792	10	1	316,800	400
14 inch	40	N/A	N/A	774	10	1	309,600	400
17 inch	50	N/A	N/A	966	10	1	483,000	500
19 inch	50	N/A	N/A	900	10	1	450,000	500
Total	**180**	**N/A**	**N/A**	**N/A**	**N/A**	**4**	**1,559,400**	**1800**

Summary Findings

The EVS 5.0.0.0 Voting System successfully met the requirements of the Data Accuracy Test by scanning and processing at least 1,549,703 ballot positions.

4.8.6 Physical Configuration Audit

A Physical Configuration Audit (PCA) of the EVS 5.0.0.0 Voting System was performed as part of the pre-testing activities in accordance with Section 6.6 of Volume II of the VVSG. The PCA compares the voting 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.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.6 Physical Configuration Audit (Continued)

The PCA performed on the EVS 5.0.0.0 Voting System consisted of inspecting the following:

- The EVS Election Management System (EMS) software platform.
- DS200 Precinct Digital Scanner.
- DS850 Digital Scan Central Ballot Scanner.
- AutoMARK ADA Ballot Marking Device.
- All accessories, equipment, and documentation used with the EVS 5.0.0.0 Voting System.

Summary Findings

An initial baseline PCA was performed prior to commencement of the test campaign and is included in the Certification Test Plan contained in Appendix D. The initial PCA was revised during testing. The final PCA is presented in Appendix A.9 of this report. No discrepancies were noted during the PCA.

4.8.7 Functional Configuration Audit (FCA)

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

A Functional Configuration Audit (FCA) of EVS 5.0.0.0 was performed in accordance with Section 6.7 of Volume II of the VVSG. The purpose of the FCA was to verify that EVS 5.0.0.0 performs as documented in the ES&S-supplied technical documentation during pre-voting, voting, and post-voting activities and validate that EVS 5.0.0.0 meets the requirements of the EAC 2005 VVSG. To perform the FCA, EVS 5.0.0.0 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;

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.7 Functional Configuration Audit (FCA) (Continued)

- 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.

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

There were deficiencies noted during this test. All deficiencies were documented during real-time test performance and were compiled into a report (presented in the Deficiency Report contained in Appendix A.11) for resolution tracking. The system successfully recovered from all abnormal and error conditions unless noted in the deficiency report. All deficiencies noted were corrected prior to the conclusion of the test campaign. The voting system successfully met the requirements of the FCA. The test cases performed and the procedures followed during the FCA are documented in the FCA Test Case Procedure Specification presented in Appendix A.3 of this report.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.8 System Level Testing (Continued)

4.8.8 Availability

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

4.9 Anomalies and Resolutions

Wyle performed compliance testing of the EVS 5.0.0.0 Voting System to the EAC 2005 VVSG. During the test campaign, all data from all "pre-testing", hardware testing, software testing, functional testing, security testing, volume testing, stress testing, usability testing, accessibility testing, and reliability testing activities were combined to ensure all applicable EAC 2005 VVSG requirements that are supported by the EVS 5.0.0.0 Voting System had been tested.

A total of eighteen (Include 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 significant 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 A.1 of this report and are summarized below, along with their resolution.

Notice of Anomaly No. 1: Vibration Test: Following the vibration test performed on May 4, 2012, the DS200 was examined for anomalies that may have occurred during testing. It was discovered, upon opening the door that covers the USB ports and power switch that parts from the lock for the door had become loose and had fallen into the area surrounding the USB ports. An ES&S technician replaced the lock and all of its components. The test was restarted from the beginning.

Notice of Anomaly No. 2: Vibration Test: Following the vibration test performed on May 7, 2012, the DS200 was examined for anomalies that may have occurred during testing. It was discovered, upon opening the exterior cover, a screw with a captive washer had become loose and fallen into the bottom area adjacent to a large connector assembly on a metal tray. An ES&S technician inserted the screw back in its original location. The other screws in the area were also inspected and found to be acceptable. The test was restarted from the beginning.

Notice of Anomaly No. 3: Vibration Test: During the setup of the vibration test, the DS200 was dropped on its side causing the carrying case with the DS200 in it to come apart from the lower part of the ballot box. The DS200 and carrying case dropped from the vibration table to the concrete floor. The carrying case and the DS200 were damaged. The DS200 was examined by Wyle and ES&S which determined the damage was too great to continue. The unit was replaced and testing continued. This internal NOA was based on unit under test being dropped by Wyle personnel, and not a VVSG non-conformity.

Notice of Anomaly No. 4: Vibration Test: Following the vibration test performed on May 16, 2012, the DS200 was examined for anomalies that may have occurred during testing. Initially a component was heard to be loose inside the LCD case. It was discovered, upon opening the exterior cover of the LCD bezel, that a screw had become loose inside of the LCD case of the DS200. The like screw on the opposing side of the LCD bezel mount was found to be loose as well, but still attached. Photographs were taken of the anomaly and the remainder of the examination revealed some wear through 3 layers of material, exposing metal of the Li-ion Rechargeable Battery. An ES&S technician inserted the screws back in its original location. ES&S added additional steps in their DS200 checkout process to inspect the

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.9 Anomalies and Resolutions (Continued)

units for loose screws and nuts. The wear on the battery did not cause any issues with the functionally of the unit. The test was restarted from the beginning and completed successfully.

Notice of Anomaly No. 5: Humidity: During the AutoMARK A100 Humidity test being performed May 25, 2012 – June 04, 2012, the Humidity Chamber suffered a controller failure on May 29, 2012. When it was observed that the required environment could not be maintained, the test was halted and the units were removed from the failing chamber. A post-operational test was performed on all four EUTs that were being tested in the humidity chamber at the time of said failure. Testing was rescheduled to be performed June 01, 2012 – June 11, 2012 in an alternate humidity chamber. This internal NOA was based on chamber failure during test, and not a VVSG non-conformity.

Notice of Anomaly No. 6: Humidity: After being subjected to the Humidity test being performed June 01, 2012 – June 11, 2012, the AutoMARK A100 failed to function properly during the Post Operating Status Check. When it was observed that the unit could not successfully mark five consecutive ballots, it was at that time that the AutoMARK A100 portion of the Humidity test was identified as a failure. The reoccurring message during the failure was "Alert! A problem has occurred. Please notify an election official. There was an error while printing". After inspection, it was determined that the Contact Image Sensor (CIS) had stopped working properly. The ES&S technician replaced the CIS and the test was repeated successfully.

Notice of Anomaly No. 7: Electrical Supply: After being subjected to the Electrical Supply test being performed on June 19, 2012 the DS200's battery was depleted after only 1 hour, 37 minutes and 20 seconds. Since the DS200 shutdown prior to completing the 2 hour requirement, the Electrical Supply Test was identified as a failure. It was determined that the animation on the "Please Insert Your Ballot" screen caused the backup battery to be depleted before the required 2 hours. The firmware was updated to stop the animation when the DS200 is on the backup battery. The test was repeated successfully.

Notice of Anomaly No. 8: Electrical Supply: After being subjected to the Electrical Supply test being performed on June 19, 2012 the DS200's battery was depleted after only 1 hour, 43 minutes and 6 seconds. Since the DS200 shutdown prior to completing the 2 hour requirement, the Electrical Supply Test was identified as a failure. It was determined that the animation on the "Please Insert Your Ballot" screen caused the backup battery to be depleted before the required 2 hours. The firmware was updated to stop the animation when the DS200 is on the backup battery. The test was repeated successfully.

Notice of Anomaly No. 9: Acoustic Noise Level Test: After being subjected to the Acoustic Noise Level Test and Hearing Aid Compatibility as performed on June 19, 2012, it was observed that the AutoMARK A100 failed to achieve the required 100 dB SPL. The AutoMARK A100 portion of the Acoustic Noise Level Test and Hearing Aid Compatibility was identified as a failure. The highest volume produced by the AutoMARK A100 was 75 dB. It was determined that an update to the firmware of the AutoMARK A100 was needed to achieve the required 100 dB SPL. The firmware was updated and the test was repeated successfully.

Notice of Anomaly No. 10: Acoustic Noise Level Test: After being subjected to the Acoustic Noise Level Test and Hearing Aid Compatibility as performed on June 19, 2012, it was observed that the AutoMARK A200 failed to achieve the required 100 dB SPL. The AutoMARK A200 portion of the Acoustic Noise Level Test and Hearing Aid Compatibility was identified as a failure. The highest volume produced by the AutoMARK A200 was 75 dB. It was determined that an update to the firmware of the AutoMARK A200 was needed to achieve the required 100 dB SPL. The firmware was fixed and the test was repeated successfully.

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.9 Anomalies and Resolutions (Continued)

Notice of Anomaly No. 11: Temperature and Power Variation: After completing 18 hours of the scheduled 85 hours of testing, six ballot jams had occurred on one of the DS850 and the testing was halted due to the quantity and frequency of the ballot jams during the test. After inspection by ES&S technicians, it was determined that slight variations within the tolerance of parts on the DS850 can cause the ballot to slightly drift in the ballot path. The ballots are positioned 2mm from the main plate. If the ballots drift too close to the main plate, they can cause jams in the DS850. This anomaly was resolved by installing a 0.012 inch polycarbonate shim beneath the first roller's block at the top. ES&S has written a document for their technicians that detail the required steps to fix this issue. The test was restarted and Wyle did not observe any additional ballots jams from this DS850.

Notice of Anomaly No. 12: Temperature and Power Variation: After completing 18 hours of the scheduled 85 hours of testing, "Camera Interface Error" had occurred on the DS850. Following the System Operating Procedure, the DS850 was shut down and restarted. Upon logging into the DS850, it was observed that "Camera Interface Error" occurred again. It was at this time that testing was halted due to the inability to proceed with the DS850. It was determined that the DS850 suffered "degradation of performance such that the device is unable to perform its intended function for longer than 10 seconds" as identified in VVSG Volume 1, 4.3.3 Reliability. After inspection by ES&S technicians, it was determined that the PCI USB controller caused the error condition. The contacts on the USB controller were in a dull condition. The technician cleaned the contacts with a pencil eraser, and the DS850 did not have this error condition again. ES&S added a cleaning procedure on the PCI USB controller during the manufacturing process to mitigate this issue.

Notice of Anomaly No. 13: Humidity: During the AutoMARK A100 Humidity test performed Nov 16, 2012 – Nov 26, 2012, there was an air pocket affecting the water supply of the test chamber, which caused the test chamber not to reach the required humidity levels. This was found on Saturday Nov 17th. The chamber was inspected by Wyle and the issue was resolved. The test was extended one day to accommodate the delay. The test was completed without any issues. This internal NOA was based on chamber failure, and not a VVSG non-conformity.

Notice of Anomaly No. 14: Temperature and Power Variation: After completing 15 hours of the scheduled 85 hours of testing, switching from 50° F to 95° F and running for 3 hours (300 ballots every hour), the DS850 started out stacking all ballots to the top tray for "decision late". The unit was rebooted and ballots could be scanned normally. On the next hour of scanning 300 ballots again, all ballots were sent to the top tray for "decision late", and rebooting again allowed ballots to be scanned normally. The test was halted. After inspection by ES&S technicians, it was determined that the bottom camera was not working properly causing the error condition when the temperature changed from 50° F to 95° F. The camera was replaced, and the test was restarted and completed successfully. Further analysis of the camera revealed a cold solder joint on the internal board of the camera that caused the error condition when the EUT got hot.

Notice of Anomaly No. 15: Volume and Stress: During the Volume and Stress test on the DS200 an error was encountered during the EQC process. The EQC process failed and would not allow the unit to continue with the only option to shut down the unit. The volume and stress test was broken down into six elections A-F to execute the system limits. Elections A-D operated without issue and the error was encountered during the loading of the "E" election. The following error code was provided: "7101012: EQC data invalid or missing". After analysis by ES&S technicians, removing the USB stick prematurely is the most common cause of this error and was the method used to reproduce the issue. Other possible causes are: EQC media was not fully seated in the USB port causing an intermittent connection failure. A

4.0 TEST FINDINGS AND RECOMMENDATIONS (Continued)

4.9 Anomalies and Resolutions (Continued)

malfunction occurred in the USB controller that services the port. A malfunction in the USB related hardware on the main board. However, the other possible causes are extremely difficult to reproduce unless the hardware related issues are severe. After Wyle determined that it was not the Volume and Stress elections that caused the error condition, the test was restarted from the beginning, but failed to complete successfully producing NOA 16.

Notice of Anomaly No. 16: Volume and Stress: After the restart of the Volume & Stress test on the DS200 (the same unit that caused NOA 15), the unit would not power up after the execution of Election A. The Volume and Stress test was broken down into six elections A-F to execute the system limits. Election A operated without issue and the unit was powered down so election B could be loaded on the unit. Wyle attempted to power up the unit to load election B three times unsuccessfully. The test was halted and ES&S was notified of the issue. After analysis by ES&S technicians, it was determined from previous experience when the motherboard would not POST (power up), it is likely that the cause was the 5 or 12 volts supplied by the ATX power supply. The ATX power supply was replaced, and Wyle could not reproduce this anomaly. After two anomalies with the same DS200 during this test, this DS200 was removed from the test campaign in accordance with the vendor TDP. This test was restarted from the beginning on a backup DS200 unit and completed successfully with no issues.

Notice of Anomaly No. 17: Source Code Review: Review of the submitted source code comprising the EVS 5.0.0.0 Voting System revealed deviations from the 2005 VVSG as well as issues with the commenting. 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.

Notice of Anomaly No. 18: 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 Wyle-generated TDP review reports on file as raw data. All discrepancies were resolved by ES&S before the conclusion of the test campaign.

4.10 Deficiencies and Resolutions

During the test campaign, deficiencies were noted that were related to system functionality and usability. The deficiencies were discovered as part of the FCA, during hardware test performance, system integration testing, usability testing, volume and stress testing, or were noted during the general test campaign and not linked to a specific test or VVSG requirement. All deficiencies were documented during real-time test performance and were compiled into a report (presented in the Deficiency Report contained in Appendix A.11) for resolution tracking. All deficiencies noted were corrected prior to the conclusion of the test campaign.

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4.11 Recommendation for Certification

Wyle performed conformance/specification testing on the ES&S EVS 5.0.0.0 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 5.0.0.0 Voting System had been tested. Wyle also used discretion as granted by the VVSG to design and exercise FCA Test Cases, perform source code reviews, and perform Security Tests.

Wyle concludes that EVS 5.0.0.0 Voting System, submitted by ES&S, meets all applicable requirements for certification as set forth in the Election Assistance Commission (EAC) 2005 Voluntary Voting Systems Guidelines, Version 1.0, as well as all additional tests performed at Wyle's discretion. As such, Wyle recommends that the EAC grant the ES&S EVS 5.0.0.0 voting system, certification to the 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 the EAC to determine if the modified system requires a new application, or can be submitted as a modified system. The scope of testing required will be determined based upon the degree of modification.

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

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APPENDIX A

ADDITIONAL FINDINGS

A.1 NOTICE OF ANOMALY

A.2 HARDWARE TEST REPORT

A.3 FUNCTIONAL CONFIGURATION AUDIT TEST CASE PROCEDURE SPECIFICATION

A.4 SECURITY TEST CASE PROCEDURE SPECIFICATION

A.5 USABILITY TEST CASE PROCEDURE SPECIFICATION

A.6 ELECTION DEFINITIONS

A.7 TECHNICAL DATA PACKAGE REVIEW REPORT

- A.7-1 TDP REVIEW SUMMARY
- A.7-2 TDP COMPLIANCE MATRIX

A.8 ES&S SOURCE CODE REVIEW REPORT

A.9 PHYSICAL CONFIGURATION AUDIT

A.10 ES&S SECURITY ASSESSMENT REPORT

A.11 DEFICIENCY REPORT

A.12 SUMMATIVE USABILITY REPORTS

- A.12-1 AUTOMARK SUMMATIVE USABILITY REPORT
- A.12-2 DS200 SUMMATIVE USABILITY REPORT

APPENDIX B

WARRANT OF ACCEPTING CHANGE CONTROL RESPONSIBILITY

ES&S WARRANT OF ACCEPTANCE CHANGE CONTROL

APPENDIX C

WITNESS BUILD

ES&S WITNESS BUILD PROCEDURE

APPENDIX D

WYLE LABORATORIES' CERTIFICATION TEST PLAN NO. T59087-01

ES&S EVS 5.0.0.0 AS RUN TEST PLAN

APPENDIX E

REQUIREMENTS MATRIX

EVS 5.0.0.0 REQUIREMENTS MATRIX

APPENDIX F

ES&S CONFORMITY STATEMENT

ES&S CONFORMITY STATEMENT

APPENDIX G

ES&S ATTESTATION OF DURABILITY

ES&S ATTESTATION OF DURABILITY

Appendix G.2
EVS 5000 Cert. of Conformance

United States Election Assistance Commission

Certificate of Conformance

ES&S EVS 5.0.0.0

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the 2005 *Voluntary Voting System Guidelines (2005 VVSG)*. Components evaluated for this certification are detailed in the attached Scope of Certification document. This certificate applies only to the specific version and release of the product in its evaluated configuration. The evaluation has been verified by the EAC in accordance with the provisions of the EAC *Voting System Testing and Certification Program Manual* and the conclusions of the testing laboratory in the test report are consistent with the evidence adduced. This certificate is not an endorsement of the product by any agency of the U.S. Government and no warranty of the product is either expressed or implied.

Product Name: EVS

Model or Version: 5.0.0.0

Name of VSTL: Wyle Laboratories

EAC Certification Number: ESSEVS5000

Date Issued: May 16, 2013

Chief Operating Officer and Acting Executive Director
U.S. Election Assistance Commission

Scope of Certification Attached

Scope of Certification

This document describes the scope of the validation and certification of the system defined above. Any use, configuration changes, revision changes, additions or subtractions from the described system are not included in this evaluation.

Significance of EAC Certification

An EAC certification is an official recognition that a voting system (in a specific configuration or configurations) has been tested to and has met an identified set of Federal voting system standards. An EAC certification is **not**:

- An endorsement of a Manufacturer, voting system, or any of the system's components.
- A Federal warranty of the voting system or any of its components.
- A determination that a voting system, when fielded, will be operated in a manner that meets all HAVA requirements.
- A substitute for State or local certification and testing.
- A determination that the system is ready for use in an election.
- A determination that any particular component of a certified system is itself certified for use outside the certified configuration.

Representation of EAC Certification

Manufacturers may not represent or imply that a voting system is certified unless it has received a Certificate of Conformance for that system. Statements regarding EAC certification in brochures, on Web sites, on displays, and in advertising/sales literature must be made solely in reference to specific systems. Any action by a Manufacturer to suggest EAC endorsement of its product or organization is strictly prohibited and may result in a Manufacturer's suspension or other action pursuant to Federal civil and criminal law.

System Overview:

ES&S EVS 5.0.0.0 is comprised of the AutoMARK Voter Assist Terminal (AutoMARK), DS200 Precinct Digital Scanner (DS200), DS850 high-speed Central Count Digital Scanner, Election Ware, Election Reporting Manager (ERM), ES&S Event Log Service, Removable Media Service (RMS) and VAT Previewer.

- AutoMARK Voter Assist Terminal enables voters who are visually or physically impaired and voters more comfortable reading or hearing instructions and choices in an alternative language to privately mark optical scan ballots. The AutoMARK supports navigation through touchscreen, physical keypad or ADA support peripheral such as a sip and puff device or two position switch.

- DS200 digital scanner is a paper ballot tabulator designed for use as a polling place scanner. After the voter makes their selections on their paper ballot, their ballot is inserted into the unit for immediate tabulation. Both sides of the ballot are scanned at the same time using a high-resolution image-scanning device that produces ballot images.
- The DS850 is a high-speed, digital scan central ballot counter that uses cameras and imaging algorithms to capture voter selections on the front and back of a ballot, evaluate results and then sort ballots into discrete bins without interrupting scanning. A dedicated audit printer generates a continuous event log. Machine level reports are produced from a second, laser printer. The scanner saves voter selections and ballot images to an internal hard disk and exports results to a USB Memory stick for processing with Election Reporting Manager.
- 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, 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 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.
- 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™.
- 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.
- 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.

Mark definition:

ES&S' declared level mark recognition for the DS200 and DS850 is a mark across the oval that is 0.2" long x 0.03" wide at any direction.

Tested Marking Devices:

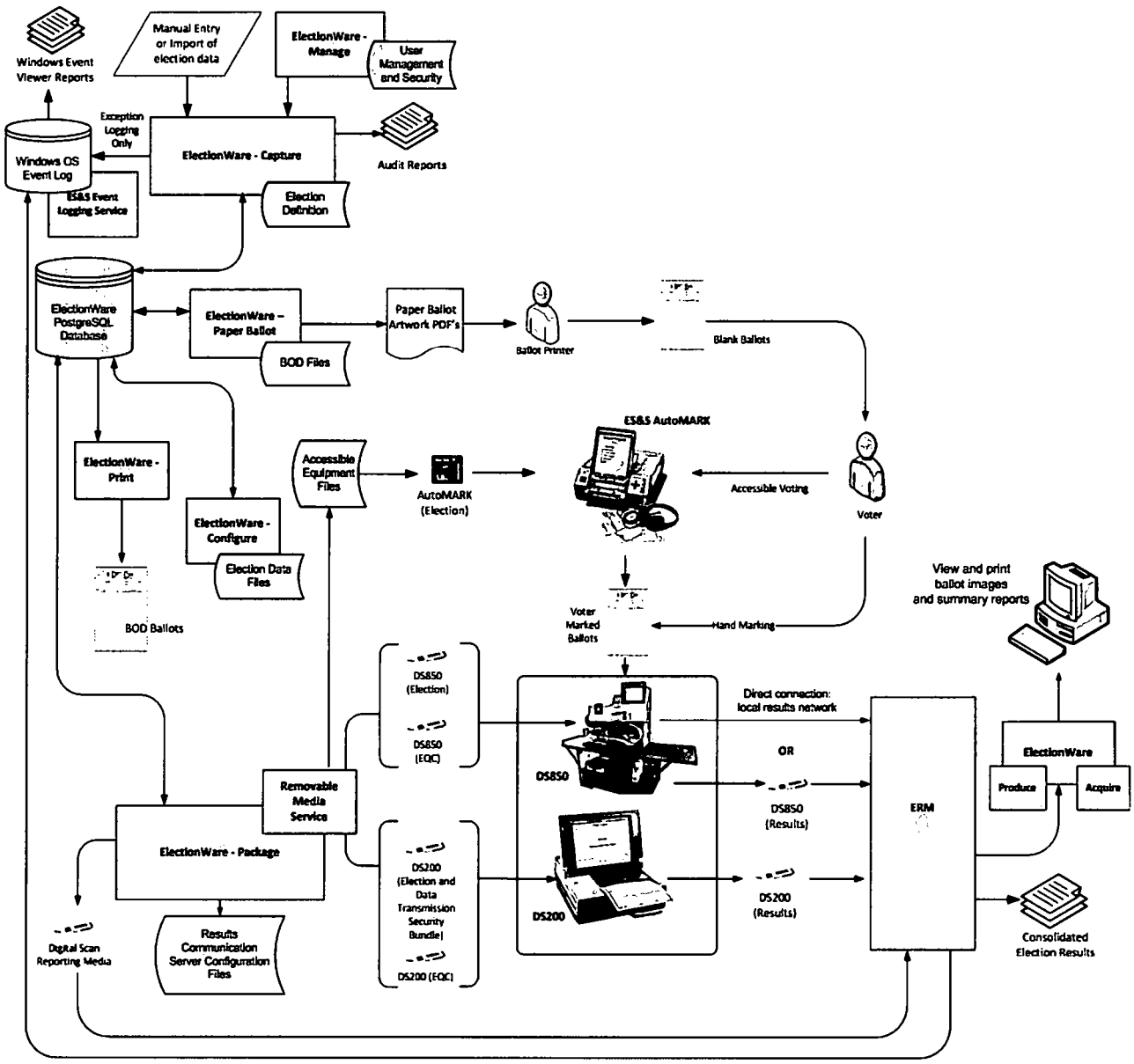
Bic Grip Roller Pen

Language capability:

EVS 5.0.0.0 supports English, Spanish, Chinese, Korean and Japanese ballot languages.

Components Included:

This section provides information describing the components and revision level of the primary components included in this Certification.



System Component	Software or Firmware Version	Hardware Version	Operating System or COTS	Comments
DS200	2.7.0.0	1.2		Precinct Digital Scanner
AutoMARK A100	1.8.1.0	1.0		ADA Ballot Marking Device
AutoMARK A200	1.8.1.0	1.1, 1.3		ADA Ballot Marking Device
AutoMARK A300	1.8.1.0	1.3		ADA Ballot Marking Device
DS850	2.4.0.0	1.0		Central Count Scanner, high-speed
Ballot Box Hardware		1.2, 1.3		Plastic ballot box
Ballot Box Hardware		1.0, 1.1, 1.2		Metal ballot box with/without diverter
Election Ware	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			
EMS Reporting Workstation		Dell Optiplex 980		
EMS Server		Dell PowerEdge T710		
EMS reporting Laptop		Dell Latitude E6410		
Ballot on Demand Printer		OKI B6300		
DS850 Report Printer		OKI B430dn		Laser report printer
DS850 Report Printer		Microline 420		Dot Matrix Printer
DS850 Audit Log		HP LaserJet 4050N		
Headphones		Avid FV-060		
USB Flash Drive		Delkin 512MB		
USB Flash Drive		Delkin 4GB		
USB Flash Drive		Delkin 8 GB		
USB Flash Drive		Delkin 1 GB		
USB Flash Drive		Delkin 2 GB		
Compact Flash		SanDisk 1.0 GB capacity & 2.0 GB capacity. Toshiba 1.0 GB capacity		

System Limitations

This table depicts the limits the system has been tested and certified to meet.

System Characteristic	Boundary or Limitation	Limiting Component
Max. precincts allowed in an election	At least 9900	ERM
Max. count for any precinct element	500,000 (65,500 from any tabulator media)	ERM report (ERM results import)
Max. candidates allowed per election	Depends on election content (limited by 21,000 maximum counters)[1]	ERM
Max. contests allowed in an election	Depends on election content (limited by 21,000 maximum counters)[2]	ERM
Max. counters allowed per precinct	Limits candidates and contests assigned to a precinct to 1,000[3]	ERM
Max. contests allowed per ballot style	200 or number of positions on ballot	N/A
Max. candidates (ballot choices) allowed per contest	175	ERM (database create)
Max. number of parties allowed	General election: 75 Primary election: 20 (including nonpartisan party)	ERM (database create)
Max. 'vote for' per contest	98	ERM (database create)
Ballot formats	All paper ballots used in an election must be the same size and contain the number of response rows.	Ballot scanning equipment
Max. Ballot Styles	9900	ERM
Max. District Types/Groups	20	ERM
Max. districts of a given type[4]	40	ERM

[1] Calculation of the number of counters must include a minimum of 4 counters for each contest, 3 overhead (overvote, undervote, precincts counted) and at least 1 candidate. Additional contest candidates each add a counter. If some precincts are defined as Absentee, a fourth overhead counter (absentee precincts counted) must be added to each contest. The number of statistical counters (Ballots Cast, Registered voters) must be added to the contest counters to determine the total counters.

[2] Example of maximum contest calculation if all contests had 2 candidates (5 counters each, 3 overhead counters + 2 candidates) and there were 10 statistical counters (i.e. Ballots Cast-Total, Republican, Democratic, Libertarian, Nonpartisan and Registered Voters-Total, Republican, Democratic, Libertarian, Nonpartisan. (21000-20)/5 = 4196 or (counter limit – statistics x 2)/number of counters/contest = number of contests.

[3] Contest counters are calculated as indicated in footnote 1, but two counters must be added for each statistical counter defined for the precinct. There are a minimum of 3 statistic counters assigned to each precinct (six added counters), "Ballots Cast," "Registered Voters" and "Ballots Cast Blank."

[4] Excludes the Precinct Group which contains all precincts.

System Characteristic	Boundary or Limitation		Limiting Component
Supported Languages	• English • Spanish • Chinese	• Korean • Japanese	System Configuration

Component Limitations:

PAPER BALLOT LIMITATIONS

1. The paper ballot code channel, which is the series of black boxes that appear between the timing track and ballot contents, limits the number of available ballot variations depending on how a jurisdiction uses this code to differentiate ballots. The code can be used to differentiate ballots using three different fields defined as: Sequence (available codes 1-26,839), Type (available codes 1-30) or Split (available codes 1-40).

2. If Sequence is used as a ballot style ID, it must be unique election-wide and the Split code will always be 1. In this case the practical style limit would be 26,000.

DS200

The ES&S DS200 configured for an early vote station does not support precinct level results reporting. An election summary report of tabulated vote totals is supported.

AUTOMARK Voter Assist Terminal

ES&S AutoMARK capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, Election Management System and ballot tabulator limitations define the boundaries and capabilities of the AutoMARK system as the maximum capacities of the ES&S AutoMARK are never approached during testing

Election Ware

ElectionWare capacities exceed the boundaries and limitations documented for ES&S voting equipment and election reporting software. For this reason, ERM and ballot tabulator limitations define the boundaries and capabilities of ElectionWare system.

ELECTION REPORTING MANAGER

1. Election Reporting Manager requires a minimum monitor screen resolution of 800x600.
2. ERM Database Create allows 1600 Precincts per Ballot Style.
3. There is a limit of 3510 precincts in the precincts counted/not counted display.
4. There is a limit of 3000 precincts in the precincts counted/not counted scrolling display.

5. Contest/Precinct selection pop up display limited to 3000 contests/precincts.
6. Non-English characters are not supported in ERM. This has to do with the creation of the XML results file out of ERM.
7. ERM's maximum page size for reports is 5,000 pages.
8. Generating a District Canvass Report without first properly creating a .DST file can result in inaccurate totals reports and inconsistent report formatting.

Functionality

2005 VVSG Supported Functionality Declaration

Feature/Characteristic	Yes/No	Comment
Voter Verified Paper Audit Trails		
VVPAT	No	
Accessibility		
Forward Approach	Yes	
Parallel (Side) Approach	Yes	
Closed Primary		
Primary: Closed	Yes	
Open Primary		
Primary: Open Standard (provide definition of how supported)	Yes	
Primary: Open Blanket (provide definition of how supported)	No	
Partisan & Non-Partisan:		
Partisan & Non-Partisan: Vote for 1 of N race	Yes	
Partisan & Non-Partisan: Multi-member ("vote for N of M") board races	Yes	
Partisan & Non-Partisan: "vote for 1" race with a single candidate and write-in voting	Yes	
Partisan & Non-Partisan "vote for 1" race with no declared candidates and write-in voting	Yes	
Write-In Voting:		
Write-in Voting: System default is a voting position identified for write-ins.	Yes	
Write-in Voting: Without selecting a write in position.	Yes	
Write-in: With No Declared Candidates	Yes	
Write-in: Identification of write-ins for resolution at central count	Yes	
Primary Presidential Delegation Nominations & Slates:		
Primary Presidential Delegation Nominations: Displayed delegate slates for each presidential party	No	
Slate & Group Voting: one selection votes the slate.	No	
Ballot Rotation:		
Rotation of Names within an Office; define all supported rotation methods for location on the ballot and vote tabulation/reporting	Yes	
Straight Party Voting:		

Feature/Characteristic	Yes/No	Comment
Straight Party: A single selection for partisan races in a general election	Yes	
Straight Party: Vote for each candidate individually	Yes	
Straight Party: Modify straight party selections with crossover votes	Yes	
Straight Party: A race without a candidate for one party	Yes	
Straight Party: N of M race (where "N">1)	Yes	
Straight Party: Excludes a partisan contest from the straight party selection	Yes	
Cross-Party Endorsement:		
Cross party endorsements, multiple parties endorse one candidate.	Yes	
Split Precincts:		
Split Precincts: Multiple ballot styles	Yes	
Split Precincts: P & M system support splits with correct contests and ballot identification of each split	Yes	
Split Precincts: DRE matches voter to all applicable races.	No	
Split Precincts: Reporting of voter counts (# of voters) to the precinct split level; Reporting of vote totals is to the precinct level	Yes	It is possible to list the number of voters.
Vote N of M:	Yes	
Vote for N of M: Counts each selected candidate, if the maximum is not exceeded.	No	
Vote for N of M: Invalidates all candidates in an overvote (paper)	No	
Recall Issues, with options:		
Recall Issues with Options: Simple Yes/No with separate race/election. (Vote Yes or No Question)	Yes	
Recall Issues with Options: Retain is the first option, Replacement candidate for the second or more options (Vote 1 of M)	Yes	
Recall Issues with Options: Two contests with access to a second contest conditional upon a specific vote in contest one. (Must vote Yes to vote in 2nd contest.)	No	
Recall Issues with Options: Two contests with access to a second contest conditional upon any vote in contest one. (Must vote Yes to vote in 2nd contest.)	No	Overturned - US District Court 7/29/03: CA Election Code sect. 11383
Cumulative Voting		
Cumulative Voting: Voters are permitted to cast, as many votes as there are seats to be filled for one or more candidates. Voters are not limited to giving only one vote to a candidate. Instead, they can put multiple votes on one or more candidate.	No	
Ranked Order Voting		
Ranked Order Voting: Voters can write in a ranked vote.	No	
Ranked Order Voting: A ballot stops being counting when all ranked choices have been eliminated	No	
Ranked Order Voting: A ballot with a skipped rank counts the vote for the next rank.	No	

Feature/Characteristic	Yes/No	Comment
Ranked Order Voting: Voters rank candidates in a contest in order of choice. A candidate receiving a majority of the first choice votes wins. If no candidate receives a majority of first choice votes, the last place candidate is deleted, each ballot cast for the deleted candidate counts for the second choice candidate listed on the ballot. The process of eliminating the last place candidate and recounting the ballots continues until one candidate receives a majority of the vote	No	
Ranked Order Voting: A ballot with two choices ranked the same, stops being counted at the point of two similarly ranked choices.	No	
Ranked Order Voting: The total number of votes for two or more candidates with the least votes is less than the votes of the candidate with the next highest number of votes, the candidates with the least votes are eliminated simultaneously and their votes transferred to the next-ranked continuing candidate.	No	
Provisional or Challenged Ballots		
Provisional/Challenged Ballots: A voted provisional ballots is identified but not included in the tabulation, but can be added in the central count.	Yes	
Provisional/Challenged Ballots: A voted provisional ballots is included in the tabulation, but is identified and can be subtracted in the central count	Yes	
Provisional/Challenged Ballots: Provisional ballots maintain the secrecy of the ballot.	Yes	
Overvotes (must support for specific type of voting system)		
Overvotes: P & M: Overvote invalidates the vote. Define how overvotes are counted.	Yes	
Overvotes: DRE: Prevented from or requires correction of overvoting.	No	
Overvotes: If a system does not prevent overvotes, it must count them. Define how overvotes are counted.	Yes	
Overvotes: DRE systems that provide a method to data enter absentee votes must account for overvotes.	No	
Undervotes		
Undervotes: System counts undervotes cast for accounting purposes	Yes	
Blank Ballots		
Totally Blank Ballots: Any blank ballot alert is tested.	Yes	
Totally Blank Ballots: If blank ballots are not immediately processed, there must be a provision to recognize and accept them	Yes	
Totally Blank Ballots: If operators can access a blank ballot, there must be a provision for resolution.	Yes	
Networking		
Wide Area Network – Use of Modems	No	
Wide Area Network – Use of Wireless	No	
Local Area Network – Use of TCP/IP	No	
Local Area Network – Use of Infrared	No	
Local Area Network – Use of Wireless	No	
FIPS 140-2 validated cryptographic module	No	
Used as (if applicable):		

Feature/Characteristic	Yes/No	Comment
Precinct counting device	Yes	DS200
Central counting device	Yes	DS850

Baseline Certification Engineering Change Order's (ECO)

This table depicts the ECO's certified with the voting system:

Change ID	Date	Component	Description	Inclusion
872	6/25/12	DS200/DS850	Release a new 4 GB USB thumb drive	De Minimis Optional
873	6/25/12	DS200/DS850	Release a new 8 GB USB thumb drive	De Minimis Optional
875	6/25/12	AutoMARK	Release 1GB Compact Flash	De Minimis Optional
876	11/10/11	AutoMARK	Redefine AutoMARK hardware revision level	De Minimis Optional
878	6/25/12	AutoMARK	End of Life AutoMARK components	De Minimis Optional
881	8/31/12	DS200/DS850	Allow color housing on 1gb, 2gb, 4gb and 8gb USB drives	De Minimis Optional
882	10/26/12	DS200/DS850	Introduce Delkin 1gb & 2gb USB drives	De Minimis Optional
884	8/31/12	DS200	Add rubber gasket for steel ballot box	De Minimis Optional
1029	8/31/12	DS200/DS850	Introduce new delkin compact flash	De Minimis Optional
1160	4/12/13	DS200	Counterfeit Sensor is end of life.	De Minimis Optional
1266	5/2/13	DS200 Carry Case	Improve DS200 Carry Case Latch Bracket	De Minimis Optional
1346	3/7/13	DS200	Change intElect logo to ESS	De Minimis Optional
1351	5/2/13	DS200 Carry Case	DS200 Carry Case replace cross recess screws with Torx head screws	De Minimis Optional
1388	5/2/13	DS200 Carry Case	Add a hinge reinforcement bracket to the DS200 carry case	De Minimis Optional

Appendix H
Preliminary Project Plan/Schedule

Preliminary Project Implementation Plan

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1. Initial statement of work; key deliverables and milestones
2. Project management approach
3. Project planning and scope/change control
4. Project schedule
5. Quality management and product acceptance
6. Communication management approach
7. Staffing management approach
8. Risk management approach
9. Project constraints and boundaries
10. Project assumptions
11. Post-implementation support

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1. Initial Statement of Work

The objective of the project is to successfully implement and support an Election Management System in Pinal County. The system will replace the current precinct scanners in favor of a central count type system to tabulate paper ballots and will accommodate the use of ADA equipment in each polling place and early voting sites. The EMS will be implemented in accordance with the contract between Election Systems and Software (ES&S) and Pinal County.

The ES&S Project Team will work with Pinal County to implement a paper-based central count tabulation system. The project will include the provision of all equipment, software, warranty, maintenance, license, support, staffing, and service deliverables defined and necessary to implement the ballot scanning and tabulation system as specified by the contract between Pinal County and ES&S. ES&S will work with Pinal County to develop an implementation approach, documented in a Master Deployment Plan that will minimize or eliminate any disruption to the normal conduct of elections and other business.

Key Deliverables and Milestones

1.1. Delivery of the central count and ADA equipment
1.2. Pre-installation of tabulator firmware prior to delivery
1.3. User Acceptance Testing support
1.4. Delivery of all EMS software and hardware necessary
1.5. Training of the County staff, using a "Train-the-Trainer" approach, on the use of all hardware and software provided for the proposed Tabulating System
1.6. User training materials and technical system documentation
1.7. Ongoing support and maintenance of the proposed system hardware and software throughout the term of the contract, ensuring that the system remains fully operational before, during and after Election Day
1.8. Upgrades and new releases of software

1.9. Programming of removable memory devices, if required by Pinal County
1.10. Project Management services led by an experienced Project Manager and supported by a full support team of subject matter experts, trainers, and technicians
1.11. Status reporting, status meetings and project documentation on a schedule specified by Pinal County.

2. Project Management Approach

The ES&S Project Team will manage the project pursuant to the Project Management Institute's project management principles. The team will use industry and PMBOK best practices and will employ its vast network of Subject Matter Experts, Certified Project Management Professionals, and various other resources to provide quality support and sound project management. The ES&S Project Team, immediately upon project initiation, will develop a detailed Master Deployment Plan that will describe all of the key aspects and processes of the overall project in full detail. Pinal County will be provided ample time to review the Master Deployment Plan. The ES&S Project Team will work with the County's office to modify the plan until it is mutually agreeable.

3. Project Plan and Change/Scope Control

The basis for the scope of the project will begin with the contract between ES&S and Pinal County. The contract defines specific deliverables, requirements, and milestones. The Master Deployment Plan will define all specific hardware, software, and service deliverables that will be documented by the ES&S Project Team under direction of Pinal County.

3.1. Key Aspects of the Master Deployment Plan:
- 3.1.1. Specified Project Deliverables – delivery, joint acceptance, training, etc.
- 3.1.2. Acceptance/Verification Procedures – process, criteria, documentation
- 3.1.3. Success Requirements – key inputs, conditions, capabilities, and expectations
- 3.1.4. Delivery and Implementation Plans – delivery milestones, critical paths
- 3.1.5. Change Control Management Plan – process for making changes to project scope

A Change Control Plan and simple Change Control Procedures will be defined within the Master Deployment Plan. This will include specified procedures for submitting, approving, tracking, and verifying all changes to the configuration of the products and the overall project. Standardized Change Notices will be used to request and track changes to the project scope and any previously agreed upon product or service deliverables. The Change Control Procedures will be developed by the Project Team under direction from Pinal County.

4. Project Schedule

Project deliverables will be fully detailed in the Master Deployment Plan. Within the Master Deployment Plan, a detailed schedule will illustrate the multiple tracking and communication methods that will be used to monitor the status of Project Deliverables and Milestones. The Project team's reporting mechanisms will update and track actual project activity for the project's duration. These mechanisms will assure communication of project status and activity to all stakeholders, including clear identification of implementation phase gateways, major milestones, and critical dependencies.

4.1. Initial High-Level Project Schedule Attached

4.2. Work Breakdown Structure
- 4.2.1. Primary Work Categories
  - 4.2.1.1. Project Initiation and Project Management (1.0)

    The Project Team will employ a methodical and simple approach to defining detailed work elements with proven project methodologies and documentation. Defining specified project milestones and

maintaining accurate documentation will allow for continuity assurance and the clear communication of project information.

4.2.1.2. Tabulation System Delivery and Acceptance (2.0)
This category of activity will include the delivery, acceptance, and/or installation of all hardware, software, and related services required to implement the tabulation system. ES&S will work with Pinal County to develop an implementation and delivery plan, including the identification of specific delivery dates. Each task and deliverable in this work category will require formal acceptance and detailed activity logging. Training and knowledge transfer activities represent an important aspect of this project and play a central role in the overall success of the tabulation system implementation. The ES&S Project Team will work closely with Pinal County to clearly define all training and outreach support activities.

4.2.1.3. Election Preparation, Support, and Execution (3.0)
The final work category will be the actual preparation and execution of all necessary election activity. This category will include activities such as EMS configuration, ballot creation, logic and accuracy testing and programming of memory devices.

5. Quality Management and Product Acceptance

To assure quality and compliance with County requirements throughout the project, the ES&S Project Team, under direction of Pinal County, will develop and maintain a Quality Management Plan within the overall Master Deployment Plan. This plan will describe all characteristics surrounding successful product and project acceptance.

The ultimate goal of the project will be to implement a quality, usable, and dependable tabulation system that Pinal County and its voters can trust. To achieve that goal, quality and performance assurance strategies in these specific categories will be managed and monitored for all product and service deliverables:

- Security
- Reliability
- Accessibility
- Accuracy
- Sustainability
- Transparency
- Functionality

All deliverables, objectives, documents, and project outcomes will require approval. The ES&S Project Team will work with Pinal County to define each specific deliverable within the Master Deployment Plan and the corresponding approval procedures required for each deliverable. Pinal County will be allowed ample time to review and provide input for all elements of the Master Deployment Plan and List of Deliverables. The County's approval will be required prior to the provision of any deliverable or distribution of any schedule of deliverables. Each deliverable and corresponding approval will be documented in the Master Deployment Plan and metrics will be defined to compare against the Plan to determine acceptance and ultimately project success.

The acceptance process for all equipment, software, services, and documentation will follow procedures specified by Pinal County. ES&S will provide recommended acceptance checklists, system test plans, operational scenario procedures, performance testing plans, stress testing plans, and procedures and will assure Pinal County is allowed time to review, modify, and approve any procedures prior to the provision of related deliverables and execution of user acceptance testing. The project team will assure that the resulting Acceptance Testing, Logic & Accuracy, and Functionality Testing Procedures are followed

specifically and documented approvals are acquired for each deliverable and/or key milestone. Specific plans and step-by-step checklists will be documented and developed within the Master Deployment Plan, including all user-acceptance testing procedures. Compliance with state configuration requirements and functionality expectations of the Secretary of State's office will be key aspects of the quality and acceptance plans.

6. The Proposed Project Team Organization and Chart

ES&S has proposed a team of top-level election professionals and experts to work with Pinal County to implement the new Election Management System in the County.

6.1. Key Personnel

6.1.1. Project Manager

The lead Project Manager (PM) will serve as the principal point of contact for Pinal County Department and will maintain responsibility for overall contract performance including delivery, implementation, training, quality management, and transitional, operational, and maintenance services.

The lead PM will be in charge of day-to-day management of the Project Team and all ES&S resources involved in the project as well as overseeing the execution and provision of all project deliverables. This individual will coordinate and organize communication between all project stakeholders and all of the various work categories within the overall project.

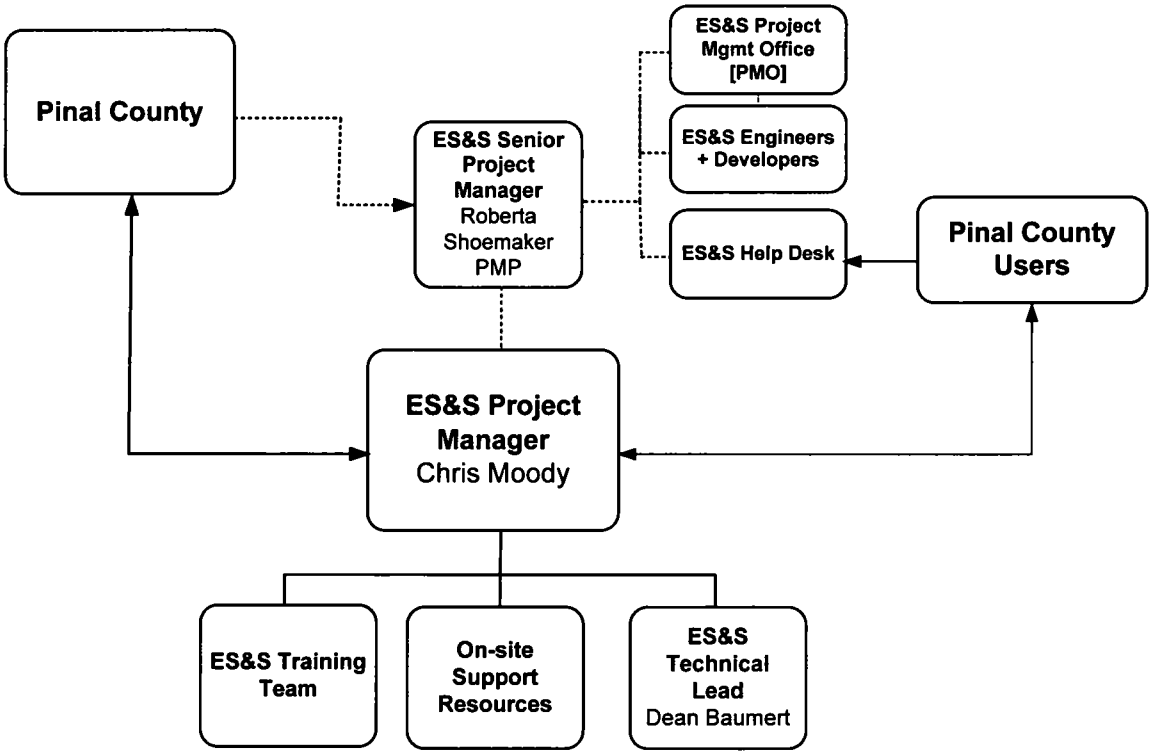
The lead Project Manager will use ES&S' network of supplemental and Associate Project Managers as necessary throughout the project. The ES&S Project Manager has full access and designated control over a team of resources throughout the ES&S organization and is empowered to make decisions as necessary to assure ES&S meets its commitments and is able to meet or exceed the expectations of Pinal County.

The Project Manager will provide weekly status reporting to assure all stakeholders are up-to-date on the key aspects of the project. The Project Manager will submit a proposed weekly report format to Pinal County that will include work accomplished, work planned, open issues, and any project deviations. Pinal County will have an opportunity to review and make changes to the report format and reporting schedule.

6.1.2. Senior Project Manager

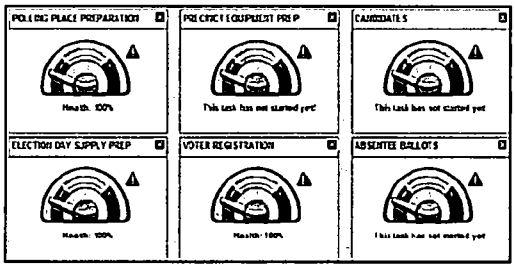
An ES&S Senior Project Manager, certified by the Project Management Institute (PMI), will be assigned to facilitate the corporate and administrative level aspects of the project. The Senior Project Manager will take an active role in monitoring project activity and providing overall project direction, issue escalation, and support.

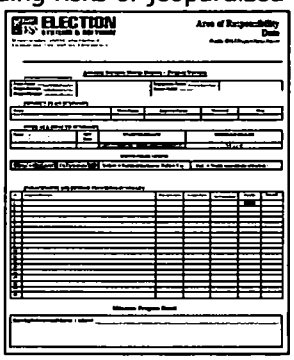
6.1.3. Initial Project Organizational Chart



7. Communication management approach

The ES&S Project Team will deploy a multi-channel approach to communication management. In addition to regular, periodic status reports that detail the status of all project deliverables and activities, the Project Manager will utilize reporting tools and periodic stakeholder meetings. Each of these communication methods, in addition to any methods preferred by Pinal County, will be used to assure all involved parties are up-to-date and able to identify any outstanding risks or jeopardized tasks. A detailed Communication Plan will be developed and maintained within the Master Deployment Plan.





The project status reports will be provided by the ES&S Project Manager for the duration of the project on a frequency determined by Pinal County. The report will clearly define all completed, current, and upcoming activity as well as the overall health of the project. Each task, deliverable, and risk will be rated and color-coded for quick interpretation of project status.

8. Staffing Management Approach

The ES&S Project Team will be supported by sufficient Project Managers, ES&S tabulation system specialists, trainers, instructional designers, subject matter experts, and documentation writers necessary to complete a successful implementation. Any time Pinal County requests additional staff or resources from ES&S, the Project Team will be able to tap its deep reserves of project professionals, tabulation system experts, and certified technicians to support project efforts.

9. Risk Management Approach

The ES&S Project Team will develop and use a comprehensive Risk Management Plan to manage all potential risks throughout the project. Early in the implementation, the ES&S Project Team will meet with Pinal County to identify potential project risks and develop initial mitigation strategies. This will include the assessment of any known obstacles, timing conflicts, previous implementation challenges, or potential emergency scenarios. After this meeting, the ES&S Project Team will expand the identification of these risks and develop detailed plans for avoiding potentially negative effects of the identified and unidentified risks. Some of the basic initial identified risks are:

9.1. Ballot Scanning / Tabulation System Transition

The new tabulation system, although specifically designed for a seamless transition from Pinal County's current tabulation system, still represents a change from the current system in place today. Changes, such as the adaptation to a new Election Management System, will need to be addressed. Past experience with such a transition indicates that this challenge is easily overcome with basic training and hands-on experience. The ES&S team will work with Pinal County to provide and/or develop training and outreach plans and materials that will help ease the transition in this area.

9.2. Timeline

The time allotted to implement any voting system requires precise planning and execution of tasks. This risk has been mitigated by advanced development of a detailed deployment plan and proposal of a project team highly experienced with tabulation system implementations in restricted timeframes. A phased implementation approach will also help mitigate this risk.

10. Project Constraints and Boundaries

The primary project constraints will be the applicable federal and local laws, regulations, acts, and initiatives that govern the tabulation system and the activities required to implement the system, including certification and verification. The secondary constraints include the availability of resources, equipment, and materials within the timeframes needed to complete activity. To assure that the constraints do not adversely affect the performance of the project, the ES&S Project Team will work diligently with Pinal County in planning project activity, mitigating potential risks, and adhering to strict quality standards.

The plan for managing project constraints and monitoring project boundaries will be included in the Risk Management Plan within the Master Deployment Plan. The Plan will include processes for assuring products and processes are not adversely affected by the project constraints. The constraints will be tracked throughout the project using the Risk Register and the Project Schedule will assist in monitoring their affect on dependent activities. Initial constraints include:

10.1. Time – Imposed and existing deadlines must be monitored throughout the project. Detailed scheduling and contingency planning will aid in managing this constraint.

10.2. Funding – The project is constrained by the funding available to acquire resources, products and services. Precise planning and maximization of available resources will help assure project demands do not exceed funding constraints.

10.3. Personnel – Trained and experienced personnel resources will be needed to support a successful implementation. Lack of such trained resources could impose a risk to a project of this size. Although

personnel constraints must be managed and monitored, ES&S has developed a resource pool that essentially eliminates the risk that this constraint imposes.

11. Project Assumptions

Project Assumptions will be defined, detailed, and rated within the Deployment Plan. Each assumption will be assessed for confidence-level, potential lead time implications, and weight of potential impact on the overall project. Initially defined assumptions include:

11.1. Project resources will be available if and when they are required
11.2. Hardware, parts, and third party components will be available as needed
11.3. Order lead times will be met and delivered upon as expected
11.4. Key statistics used to develop budgets and projections will hold true
11.5. Government regulations will not change in ways that drastically affect the project outcome
11.6. Project scope will be limited and changes will not be imposed without due process

Each of these assumptions, and additional assumptions defined in the Master Deployment Plan will be monitored and managed throughout the life of the project.

12. Post-Implementation Support

Following the implementation phases of the project, ES&S will provide the level of maintenance and support desired by Pinal County. The implementation will be executed in such a way that allows Pinal County the flexibility to determine which ongoing responsibilities should be covered by ES&S and/or County staff.

Based on the determination of Pinal County, ES&S will provide all necessary training and knowledge transfer to allow the County's office to perform any or all of the ongoing support responsibilities. Should increases or decreases in the support be desired, ES&S will accommodate. ES&S maintains a talent and personnel program that allows for surge and seasonal staffing flexibility based upon project needs.

The principal post-implementation support activities fall in to these categories:

12.1. Equipment Maintenance

Both routine preventative maintenance and remedial repair maintenance will be required for the entire life cycle of the tabulation system. Varying methods of preventative and repair maintenance could be applied. It is important that a plan is established early in the project to assure the hardware components and equipment continue to operate at an efficient and satisfactory level.

12.2. Training

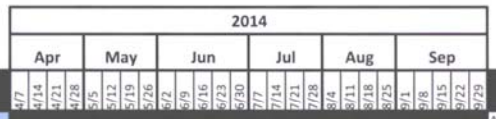
ES&S has recognized that a basic ongoing training effort is recommended to maintain a high level of understanding and competence with the tabulation system. Employee turnover can be common and a long-term and "refresher" training strategy will help mitigate risks associated with such turnover. Ongoing training responsibilities could potentially be handled by existing Pinal County staff or ES&S Training Services could be used to meet, or help meet, this need.

12.3. Software Maintenance and Support

From time to time, software support and enhancements may be needed by Pinal County. This support could be in the form of troubleshooting, guidance, best practices, refresher assistance, and software enhancements and upgrades. ES&S will work with Pinal County to develop and prepare for an appropriate post-implementation support and maintenance program.

ES&S - Pinal County Election Management System Implementation Weekly Project Schedule

Task	Start	Finish	Description
Project Initiation Management	**4/23/14**	**9/9/14**	A trained and experienced Project Manager will be assigned to work with Pinal County for the project duration.
Conduct Implementation Kick-Off Meeting	4/23/14	4/23/14	Initial meetings will be conducted early in the project to solidify dates and requirements.
Finalize Concrete Implementation Schedule	4/24/14	4/25/14	A solidified Project Schedule will be presented to the County for review, approval, and eventual distribution.
Weekly Updates and Project Management	4/23/14	9/1/14	The Project Manager will provide updates, reporting, and conduct status meetings at a schedule dictated by the SOE.
Delivery and Acceptance	**5/5/14**	**5/16/14**	Deliveries and implementation will be coordinate with the County in a way to avoid any impact on ongoing activity.
Deliver / Install DS850s, AutoMARKs, and Supplies	4/28/14	5/2/14	The ES&S Project Team will accommodate the delivery needs of the County.
Deliver and Install Electionware Software	4/28/14	5/2/14	Electionware Specialists will install the Electionware EMS and any system components desired by the County.
Perform Onsite Acceptance Testing	5/5/14	5/9/14	The ES&S Project Team will assist the County in performing a full system acceptance and verification test.
Training and Documentation	**5/5/14**	**5/23/14**	The ES&S Team will develop a training schedule to assure all County staff are prepared for the ongoing management of the voting system.
Provide System Documentation	5/5/14	5/9/14	System Documentation, User Manuals, and Training Guides will be provided to County staff early in the project.
Conduct Staff Training	5/12/14	5/16/14	Experienced ES&S Trainers will transfer knowledge to County staff in an effective format and schedule, approved by the County.
Pre-Election Preparation	**6/23/14**	**7/21/14**	The ES&S Team will be on-site with Pinal staff developing and executing a pre-election voting system deployment plan.
Import Eware Database Ballots, and Audio	6/23/14	6/27/14	ES&S technical staff will assure data is ready to import seamlessly in to Electionware and integrate with Pinal VR and Pollbook systems.
Proof/Certify Ballot Design + Audio	6/30/14	7/3/14	System features and on-site ES&S staff will help assure that proofing of ballot/jurisdictional data is simple for Pinal staff.
Program USB Sticks and other Media	7/7/14	7/11/14	Once ballot data is verified, ballots can be produced and Election and Test media can be created.
Perform Internal L&A Tests	7/14/14	7/14/14	Internal testing and verification can be completed quickly and easily. Automated test deck utilities expedite the L&A process.
Perform Public L&A Tests	7/21/14	7/21/14	ES&S staff will help support Public L&A tests and demonstrations as requested by the County.
Election Support	**7/31/14**	**9/9/14**	ES&S will provide on-site support as needed throughout the project including subject-matter-experts during appropriate times.
Scan Early Voting Ballots with DS850	8/20/14	8/26/14	The DS850 provides flexibility during the Early Voting scanning period. The high-speed scanner will keep pace with ballot returns.
Election Event Support	8/25/14	8/27/14	ES&S support staff will be on-site Election Day to provide support. Remote support will be on-call around the clock.
Election Day	**8/26/14**	**8/26/14**	Election Day - ES&S will be on-site to assist the county as needed with conducting election day operations.
Post Election Support	**7/31/14**	**9/9/14**	ES&S will provide on-site support as needed throughout the project including post Election support.
Provide Post-Election Support	8/27/14	8/29/12	ES&S staff will be on-site to assist with closing the books and finalizing the election.
Wrap Up Meetings and Improvement Plan	9/9/14	9/9/14	The ES&S Project Manager will meet with the County staff to develop plans for improving and executing the next election cycle.



Appendix I
Technical Literature

ES&S DS850
Operator's Guide

Document Version 11.1

Version Release:

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Election Systems and Software, LLC
Corporate Headquarters
11208 John Galt Blvd.
Omaha, Nebraska 68137
United States of America
Phone: (402) 593-0101
Toll Free Inside of U.S.: (877) 377-8683
Fax: (402) 593-8107
http://www.essvote.com
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DS850 Operator's Guide, ES&S, Omaha, NE

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The document sections referenced below contain Election Systems and Software, Inc. (ES&S) confidential information, which is provided for the sole purpose of permitting the recipient, to evaluate the ES&S Voting System submitted herewith. The following sections are designated as "Proprietary and Confidential" by Election Systems & Software.

Proprietary Document Section	Description
N/A	N/A

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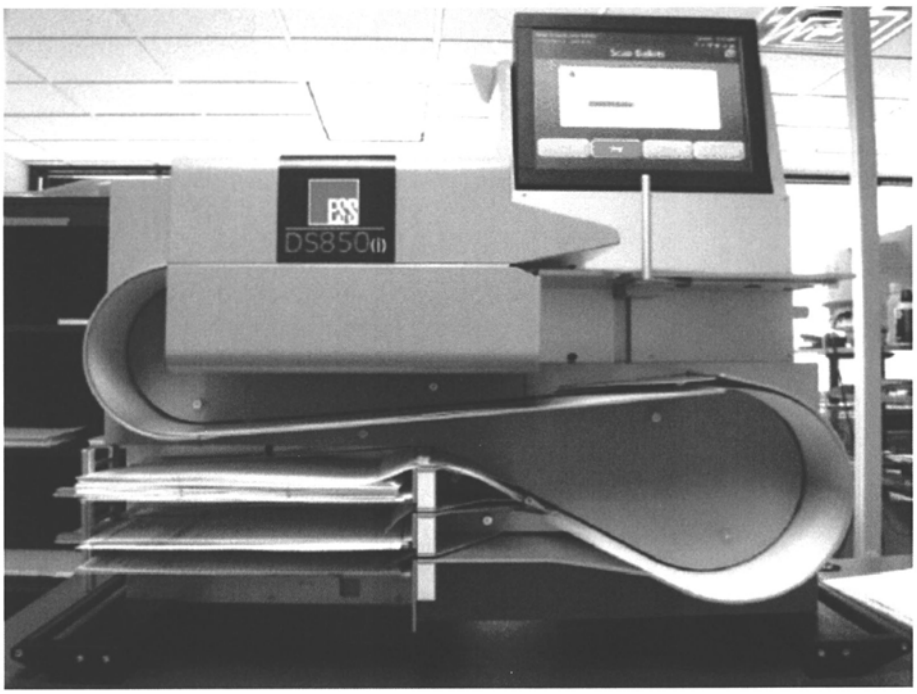
Part 1: Introduction

The Introduction contains the following chapters:

- Chapter 1: DS850 Overview
- Chapter 2: Safety Information
- Chapter 3: DS850 User Interface

Chapter 1: DS850 Overview

The ES&S DS850 is a high-speed, computerized, digital image-based scanner and tabulator with ballot sorting capabilities. The ES&S DS850 is designed to process all of the ballot types supported by the ES&S election management system, including folded (absentee) ballots.



The DS850 accurately records all votes as marked by the voter and is capable of meeting or exceeding the 1.5 million mark test as stated in Volume 1, Section 2.1.1 of the 2005 VVSG. Voter accumulation records are saved on the machine's hard drive and can be transferred from the hard drive to a USB flash drive.

The DS850 is capable of supporting multiple election models. In a traditional central count model, voting takes place at various locations within a precinct, and when the polls close, the ballots are physically transported to a central location, then scanned and tabulated using the ES&S DS850. In a traditional precinct count model, ballots are scanned during election day on an ES&S precinct scanner and tabulated once the polls are closed. In this precinct-based model, the central count scanner is used to process early voting and absentee ballots by scanning the ballots in the days up to and including election day and subsequently tabulating them when the election is closed. In an all mail-in model, all ballots are physically collected via mail to one or more central locations and scanned up until the polls close on election day, at which time they are tabulated.

This manual and the *ES&S DS850 System Maintenance Manual* are intended to help you develop election procedures. However, election laws and procedures vary from state to state, and your procedures must be in compliance with the laws and procedures that apply to your jurisdiction.

ES&S Elections

Jurisdictional Nomenclature

Terminology for the lowest-level common geopolitical civil division differs by state and country. In this manual and other ES&S documentation, the entity is referred to as a precinct.

As a company with accounts across the country and around the world, ES&S recognizes that certain jurisdictions use terms other than precinct. Some examples of the terms used by other jurisdictions are Election District (or ED), Borough, Province, Division, and District. These terms and others may be substituted for precinct depending upon the particular jurisdiction. However, for consistency, ES&S uses the term precinct throughout its documentation.

Election Definition

Using ElectionWare, election coders program a custom election definition onto a USB flash drive for each DS850 used in your jurisdiction. An election definition contains all of the candidates, contests, and ballot variations that the scanner will process at the polling place. It also contains the user-defined codes that must be entered on the scanner to perform various functions. The election definition provides default values for configuration settings, some of which can be modified on the scanner after the election definition is loaded.

Note: Screen text that ends with an ellipsis (…) indicates that more characters were entered for the text in ElectionWare than the DS850 can display

Election Security

All ports for connecting USB and Ethernet devices are located behind lockable doors. Each of these locations contains a provision for a wire seal for an additional level of security. See Locks and Seals for information on the placement of the locks and seals.

Access to various system screens require entry of a code to prevent unauthorized access to certain system functions.

The DS850 records errors and major events and tags these incidents with the date and time the incident occurred based on the DS850's real-time clock settings. Audit log information can be exported to a USB flash drive inserted into a USB port on the DS850. The Zero Report, which is printed before polls are open on Election Day, is used to indicate no tampering has been done to the vote totals.

Election officials using the DS850 must provide physical security measures or implement procedures that limit access to the DS850 during the election period to authorized personnel only. The election period encompasses the time the election definition is loaded onto the system to the time final, official election results are produced and validated.

Provisional Voting

In paper ballot-based systems, provisional ballots are handled procedurally. Voters are allowed to vote a paper ballot that is segregated from valid Election Day ballots. After the election, each provisional ballot envelope is authenticated against the appropriate criteria and either allowed or not allowed. Those ballots found to be valid are then opened and included in the Election Day totals according to processes defined by your jurisdiction's requirements. For example, some jurisdictions may hand-count provisional ballots and manually enter them into Election Reporting Manager (ERM), while others may create a separate election group and scan the ballots using a precinct or central scanner such as the DS850.

Facilities, Furnishings, and Fixtures Required for DS850 Operation

The following facilities, furnishings, and fixtures are required to operate the DS850:

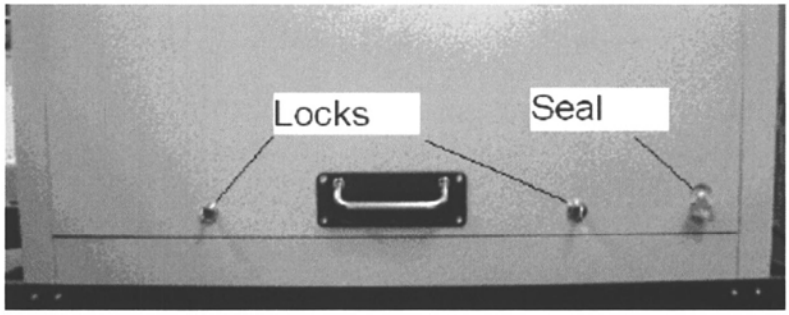
- ES&S recommends using the metal cart available for the DS850 for easier setup and movement of the machine, which weighs approximately 200 pounds. The metal cart weighs 190 pounds.
- The DS850 is intended for indoor use only. During tabulation, ES&S recommends the DS850 should be operated in a room measuring a minimum of 10 feet by 10 feet.
- The DS850 can be operated in any temperature controlled facility, with temperatures from 50 degrees Fahrenheit to 95 degrees Fahrenheit. Operational humidity during operations should be between 10 and 88 percent RH. The DS850 is not protected against harmful ingress of moisture.
- A standard 110V outlet must exist in the facility for power cord plug in. The DS850's input rating is 120V~50/60 Hz 8.0A single phase or 240V~50/60 Hz 8.0A dual phase. The main supply voltage fluctuations are not to exceed plus or minus 10 percent of the rated supply voltage range. To ensure 2 hours of uninterruptible power you must use an Uninterruptible Power Supply (UPS) with the DS850.
- The storage temperature for the DS850 is from -4 degrees Fahrenheit to 140 degrees Fahrenheit.

Reference: See Chapter 2: Safety Information for a complete list of the DS850 specifications and cautions.

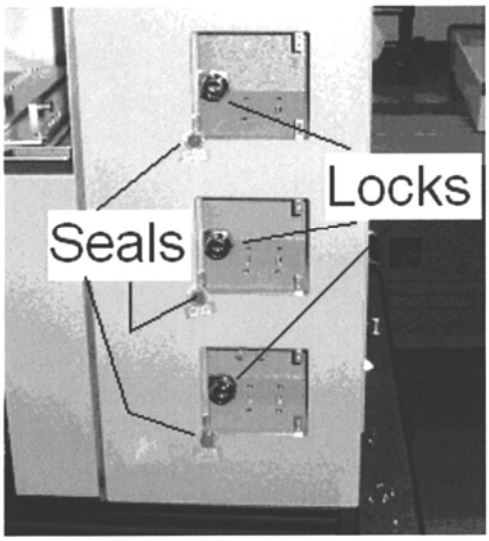
Locks and Seals

ES&S recommends the lock and seal placements described below to physically lock down the DS850 and prevent system tampering.

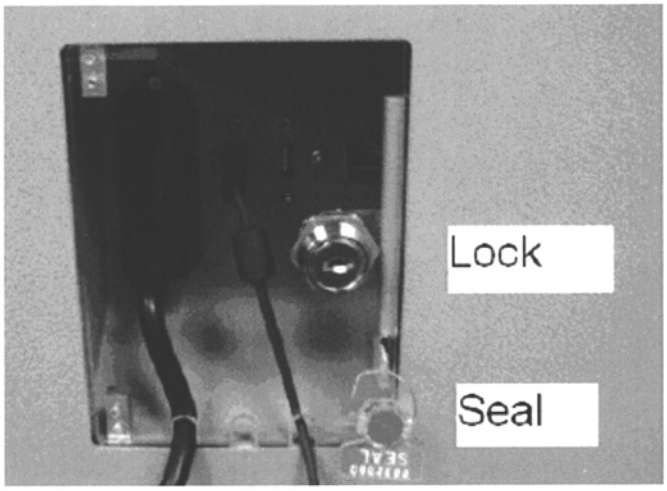
The rear of the scanner is secured by locking both door locks. A tamper-evident tape seal can be used for additional security.



The DS850 data ports on the right side of the DS850 are all behind clear access doors that can be protected by both locks and seals.



The DS850 data ports on the left side of the DS850 are all behind a clear access door that can be protected by both a lock and a seal.



Note: See Election Security in this chapter for more information.

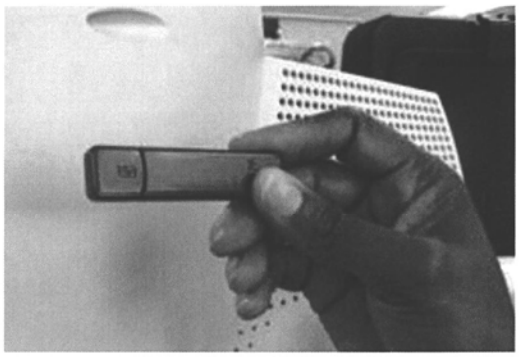
Using USB Media Devices

USB Media Devices are used to clear and initialize the DS850, load an election definition into the DS850, create an archive, and export data that has been saved to the DS850's internal memory. The ES&S EQC Media Device flash drive is used clear all data from the machine and load the encryption keys that are needed to load and run the election. The ES&S Election Definition Media Device flash drive is used to load the election definition into the scanner. ES&S Election Definition Media Device flash drives and blank ES&S Media Device flash drives and can be used to create an archive and to export data.

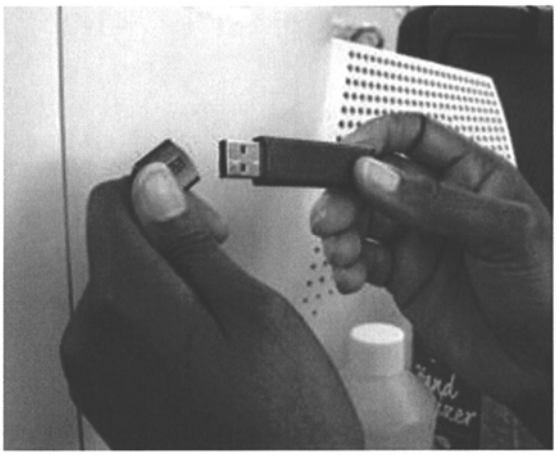
Reference: See Clearing and Initializing the Scanner, Loading the Election Definition, and Exporting Data for more information on these processes.

Note: If you choose to use USB Media Devices, it is strongly recommended that you use fully-formatted USB Media Devices rather than the Quick-formatted or cleared (all files deleted) flash drives. The fully-formatted flash drives work faster and are more reliable. If you have any questions about formatting your flash drives contact ES&S.

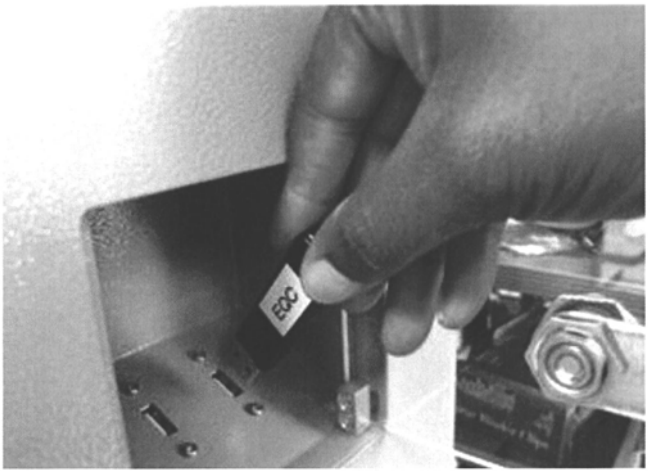
The picture on the right shows a typical USB flash drive.



Before inserting a USB flash drive, remove the protective plastic cap to expose the USB connector.



The ES&S EQC Media Device flash drive, the ES&S Election Definition Media Device flash drive, and a blank ES&S Media Device flash drive can be inserted into any one of the USB ports on the DS850. Never force a USB flash drive into a USB port.

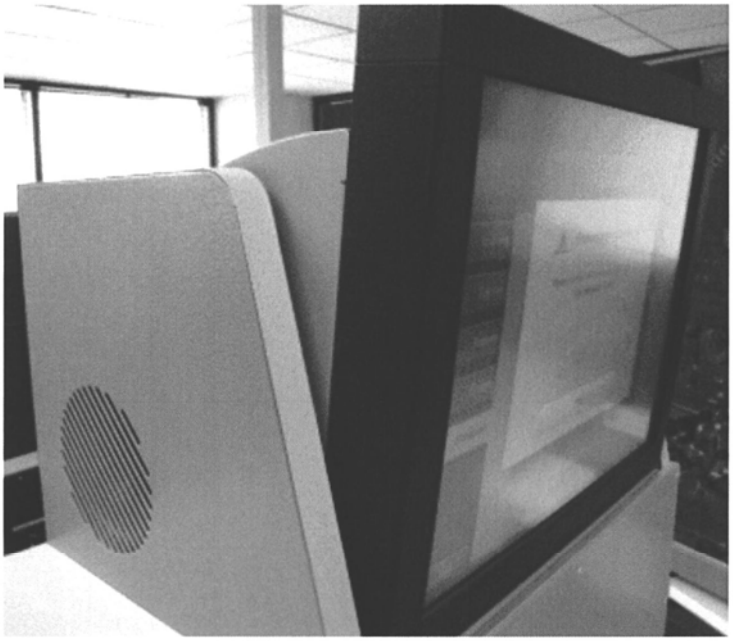


Adjusting the DS850 Workspace

You can make several manual adjustments to the DS850 workspace to improve usability, including adjusting the tilt of the screen, changing the length of the input and output trays, and raising and lowering the side of the DS850's cart.

Adjusting the Tilt of the Screen

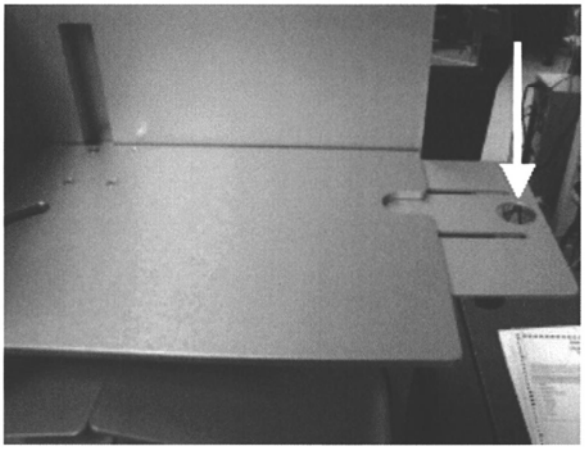
You can tilt the screen forward to achieve a potentially better viewing angle by gently pulling the top of the screen outward. The picture on the right shows a screen that has been pulled forward.



Adjusting the Input and Output Trays

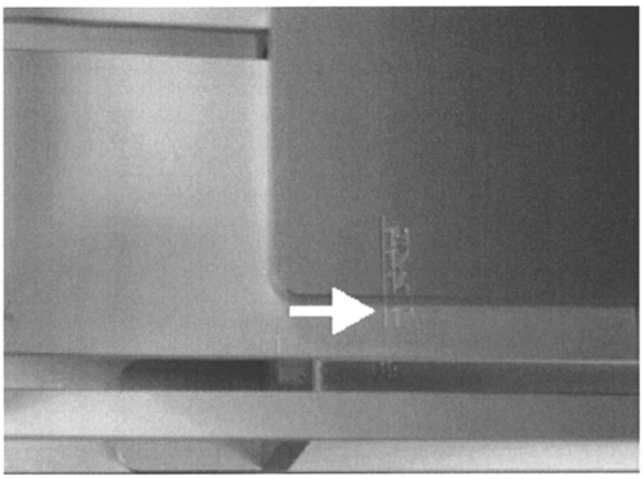
You can adjust the length of the input and output trays to accommodate different sized ballots.

The input tray can be extended to provide a solid support for longer ballots. Use the round opening to pull the extension to the right for longer ballots. Slide the extension to the left for shorter ballots. The picture on the right shows the input tray extended for longer ballots.

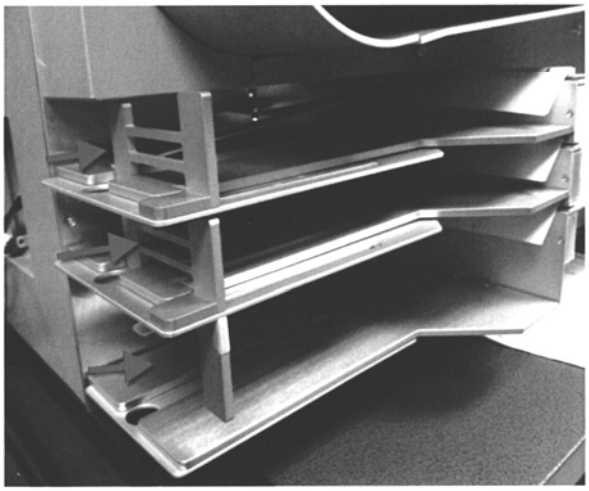


It is also important that the output trays (or bins) be adjusted to the proper length before the ballots are scanned. If the output trays are set for ballots that are longer than the ones being scanned, the ballots might overshoot the trays as they come through the transport. If the output trays are set for ballots that are shorter than the ones being scanned, the ballots will jam up in the trays.

Adjusting the output trays consists of changing the length of the trays and the position of the output tray paper stops. Each of the output trays, like the input tray, has an extension with a round opening in it. You can use the opening to pull the extension to the left for longer ballots, and you can slide the extension to the right for shorter ballots. There are markings on the output trays to help you adjust them to the correct length for the ballots. The picture on the right shows an output tray set for 17" ballots.

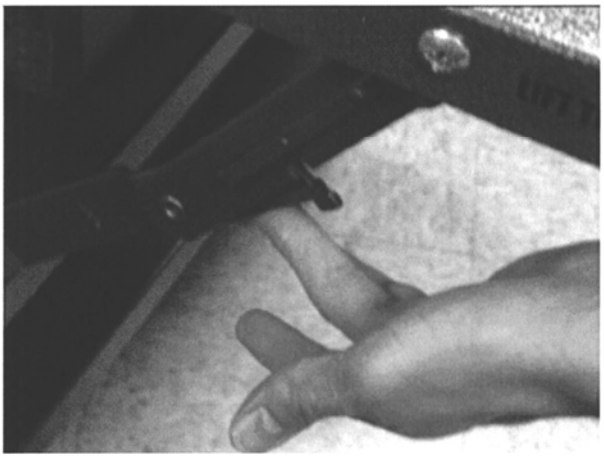


After you adjust the length of the output trays, set a sample ballot in each of them. Then slide the output tray paper stops so that there is approximately 10 mm between the stop and the end of the ballot. The picture at the right shows the output tray paper stops.



Raising and Lowering the DS850's Cart Extension

To use the DS850 cart extension, lift up on the extension until it is level and push up on the brackets on both sides (as shown in the picture on the right) until they lock into place.



To lower the extension, simultaneously press the release button on the inside of the bracket and press down on the hinge of the bracket. Repeat this process with the other bracket and carefully lower the extension. The extension must not be allowed to drop as to prevent damage to the extension and the cart.

Uninterruptible Power Supply (UPS)

To ensure 2 hours of uninterruptible power you must use an Uninterruptible Power Supply (UPS) with the DS850. This will provide continuous power to the machine and to prevent the DS850 and the attached printers from being damaged in case of a power surge.

Note: The DS850 was certified using an external UPS to comply with electrical test requirements in the VVSG. The DS850 must be operated with an external UPS to be in a certified configuration.

Reference: See Chapter 5: Pre-Election Day Tasks for information on installing the UPS, attaching the DS850 and printers to the UPS, turning on the UPS, and checking that the UPS is communicating with the DS850.

Installing New Firmware

A certified ES&S Technician will usually install new firmware on the DS850. If you have been instructed to install the new firmware an ES&S Support Representative will assist you in the process. .

Warning: Contact an ES&S Technician for instructions to return your DS850 to an earlier firmware version. Do not use an earlier firmware update Compact Flash card to revert a DS850 firmware version back to an earlier version.

Note: The Compact Flash card must be a minimum of 1 GB.

Contacting ES&S for Technical Support

This manual should aid you in accomplishing most tasks. However, if you need additional assistance, or if you encounter a processing problem or system error, ES&S' technical support staff can provide advice and help you resolve the situation.

When you contact ES&S for technical support, be near your equipment. In addition, be prepared to provide the following information to the support representative:

- The version number of the product you are using.
- The *exact* wording of any messages that appeared.
- A description of what happened when the problem occurred.

Support representatives are available Monday through Friday, between 8:00 A.M. and 5:00 P.M. CST.

Contact an ES&S Support Representative

Telephone Number (USA & Canada):	877-377-8683
Telephone Number (International):	402-593-0101
Fax:	402-593-8107
Address:	Election Systems & Software 11208 John Galt Blvd. Omaha, NE 68137 USA

Note: ES&S' support services are subject to ES&S' prices, terms, and conditions in place at the time the service is used.

Contacting ES&S for Supplies

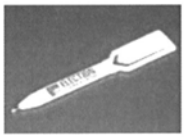
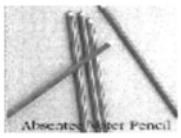
ES&S recommends that you keep the supplies listed below on hand for each DS850. You can order these items from ES&S by calling (877) 377-8683. Allow four weeks for delivery.

- 8.5" x 11", continuous feed, one-part paper for the audit log printer: ES&S recommends that the printer paper be carbon-less to avoid smearing. If you will be using ERM the same type of one-part paper can be used for both the ERM and DS850 continuous-feed printers. **Quantity:** two boxes.
- **8.5" x 11", standard laser printer paper for the laser printer. Quantity:** two boxes.
- **Pressurized air cans:** Used to clean the sensors. **Quantity:** two.
- **Cloth and isopropyl alcohol: Used to clean the rollers. Quantity:** one bottle.
- **Small white adhesive labels, ½ inch wide**: Use these labels to cover stray marks on the ballots. Only use labels from ES&S. **Quantity:** 12 sheets.
- **USB flash drives:** These must be FAT32 formatted drives. Depending on the number of ballots processed, you may need multiple drives to transfer all of the ballot image data. Election results data will fit on a single drive. The minimum size is 1GB and the maximum is 8 GB. **Quantity:** 6

Warning: The flash drives you use in the DS850 must be used for the election process only. Using the drives for anything other than the election process violates security practices.

- **Marking Devices:** Although the DS850 reads a wide variety of marking devices, ES&S recommends that you use the following devices:

VL Ballot Pen (ES&S part # 6100). The pen is a BIC Grip roller ball with black ink and a 0.7 mm tip.	

Absentee Pen (ES&S part #00500) Easily fits into an envelope for mailing.	
Absentee Pencil (ES&S part # 00540) Red, 0.125 point	

- Audit log printer ribbon (ES&S part # 4778)
  Quantity: 1 per printer
- Report Printer Toner Cartridge (ES&S part # 6826)
  Quantity: 1 per printer
- Touch screen cleaning kit.

General Timeline for Election Preparation

General Timeline for Election Preparation

90 Days	Submit site support request to ES&S
63 Days	All forms are due to ES&S (excluding Candidate forms)
56 Days	Candidate forms due to ES&S
46 Days	Last day to give ballot proofs to counties (strictly for military or overseas voting)
45 Days	Absentee Voting begins
42 Days	Certification deadline
28 Days	All ballot proofs must be signed off
21 Days	Last day to deliver Election Day ballots
20 Days	Advance or early voting begins
18 Days	Last day for ES&S to ship coding materials
10 Days	Software installation for pre-election procedures
1 Day	Early voting ends

Reference: Refer to the *Personnel Deployment and Training Requirements* document for more information.

Operations Support Frequently Asked Questions

- How is the system purchased?

  You can purchase the DS850 by contacting your ES&S representative.

- How is the system installed?

  You can install new firmware to the DS850 by following the steps in the ES&S implementation plan. See Installing New Firmware for more information.

- How can I verify the system?

  You can verify the system in the following ways:

- Compare the serial numbers on the hardware to the numbers on the purchase order.
- Compare the firmware version to the version listed on the purchase order.
- The Acceptance Checklist will aid in the verification of the system.

◆ What training is required?

Training is determined at the time the system is purchased.

◆ What checklist should be followed?

Use the Acceptance Checklist to ensure that the system has been delivered and is performing as expected.

System Acquisition Procedures

Use the Acceptance Checklist to ensure that the system has been delivered and is performing as expected. The following is a descriptive list of the DS850 acceptance testing criteria.

Visual Inspection

- Ensure that there are no scratches or gouges on any part of the unit.
- Verify that all labels are placed in their appropriate place and in their correct orientation.
- Check the wheel locks on the table to ensure the cart rolls freely in the unlocked position and does not when the wheels are locked.
- Inspect the table's folding extensions and drawer for proper operation.
- Verify all locks and doors have a smooth function and are locked.
- Open the rear door on the scanner and check for any loose connections or damaged parts.
- Ensure that all belts, transport rollers, and protective guards are in place.

Physical Inspection

- Install the UPS, connect the printers and the scanner to the UPS, set up the printers, and then turn on the UPS and the scanner. See Chapter 5: Pre-Election Day Tasks for instructions.

- Observe that both printers and the DS850 power on. If an election has been loaded, at the Login screen, enter the Election Code.
- Verify that the AC power icon is present in the upper right-hand corner of the screen and that it indicates that the power connection is plugged in.
- Verify that a red "X" is not displayed on the printer icons.
- Perform Touch Screen calibration by selecting the Hardware menu and then pressing **Screen Calibration**. Touch the circle in the upper left-hand corner. When the screen with a circle in the lower right-hand corner appears, touch that circle. Touch the next screen in multiple places to verify that the pointer (x) will follow the touch points. Then press the **Save & Exit** button.
- Verify that the DS850 firmware version matches the certified version for your jurisdiction. To do so, select the System menu and then press **Firmware**. COTS firmware versions that the system can report will also be displayed.
- Test each of the USB ports on the DS850 by using the following procedure:
  - Press **Election** to access the Election menu.
  - From the Election menu, press **Setup** to access the Setup screen.
  - On the Setup screen, press **Clear and Initialize**. This displays the *Searching for EQC Media Device* pop-up screen.
  - Insert the ES&S EQC Media Device flash drive into one of the scanner's USB ports. The previous pop-up screen is temporarily replaced by a *Detecting inserted device* pop-up screen. When the scanner recognizes the ES&S EQC Media Device flash drive, the Qualification Code screen appears.
  - Press **Cancel** and move the USB flash drive into another unused USB port.
  - Repeat the steps above for each unused USB port, except for the last one, to ensure that each USB port on the scanner is functioning correctly. On the last port, clear and initialize the scanner. See Clearing and Initializing the Scanner for instructions.
- Check the date and time displayed at the top of each screen to ensure the date and time are correct. If necessary, change the time and date. See Setting the Date/Time for instructions on modifying the scanner's system date and time.
- Load the election definition into the scanner. See Loading the Election Definition for instructions.
- Load the ES&S test deck of ballots onto the input tray of the scanner.
- Scan the test deck of ballots. See Scanning for instructions.
- Save the election results to a USB flash drive. See Exporting Data for instructions.

- Print the election results reports and compare them to the reports provided by ES&S to verify that the scanner is reading the ballot marks accurately. See Printing Election Reports for instructions on printing reports. See Chapter 8: Reports for more information and examples of the reports.
- Verify that the scanner can detect when power to the UPS is lost. See Checking the Connection Between the UPS and the Scanner for instructions on checking whether the scanner can detect when power to the UPS is lost.
- Power down both printers and the scanner, then power down the UPS. See14. Follow manufacturer recommendations for environmental storage conditions for all your election materials. (See Specifications and Cautions for storage requirements of the DS850). for instructions on how to shut down and power off the scanner. See Turn Off the UPS for instructions on turning off the UPS.
- Place the dust cover over the scanner, and ensure it is free of tears and rips.

Acceptance Checklist

Shown below is an example of the Acceptance Checklist for the DS850.

ES&S ELECTION

DS850 Acceptance Check List

Serial Number: _____ Date _____

Owner _____

Physical Inspection

- ☐ Table is free of scratches or other damage
- ☐ Table wings latch OK
- ☐ Labels: Serial, EAC, Safety
- ☐ Printers complete– AC cords, USB cables, ribbon/toner
- ☐ Printer Paper
- ☐ Display hinge
- ☐ Camera head hinge
- ☐ Door latch
- ☐ I/O doors
- ☐ Locks and Hardware
- ☐ Camera clean and free of dust
- ☐ Paper path free of dust and debris
- ☐ Output tray adjustment

Functional Testing

- ☐ Boot up
- ☐ Firmware version _____
- ☐ Touch Screen calibration
- ☐ Time and Date
- ☐ USB Ports
- ☐ Load Test Election
- ☐ Run Test Deck
- ☐ Verify Test Deck Results
- ☐ Clear and Initalize
- ☐ Log report
- ☐ Imprinter
- ☐ Multisheet
- ☐ Final Inspection

Chapter 2: Safety Information

When used properly, the DS850 is safe and effective. The following symbols, used throughout this manual, indicate when hazards may occur during normal operation of the scanner. Read the warnings and proceed with caution when you carry out potentially hazardous scanner operations.

Warning Icons

Symbol	Definition
	Electrical Shock Danger: This symbol indicates a danger of electric shock. There are high voltages present inside the enclosure of DS850 scanner. To reduce the risk of fire or electric shock, do not attempt to open any enclosures or gain access to areas for which you have not been trained. Only ES&S qualified personnel should open enclosed areas of the scanner.
	Warning: This user caution symbol indicates that damage to the scanner or injury to the user could occur if the proper procedures are not followed. Carefully follow all instructions and proceed with caution when this symbol is associated with a set of instructions.
	Caution: Keep fingers, hands, and loose clothing clear of the areas where this symbol is displayed.

Important Safety Instructions

Please read all safety instructions before operating the DS850. Carefully follow all instructions and heed all warnings.

Power Sources

Operate this product only from the type of power source indicated in this manual. Make sure that the installation complies with applicable sections of the National Electric Code. Consult your local building code before installing. See Facilities, Furnishings, and Fixtures Required for DS850 Operation for more information.

Ventilation

Slots and openings in the case of the DS850 are included to provide adequate ventilation for the unit. These openings must remain clear. Do not block or cover any openings in the DS850 case; otherwise, the unit could overheat. Do not operate the DS850 in an enclosed housing not approved by ES&S.

Water and Moisture

Warning: Do not place containers with liquids such as coffee, water, or soda on or around the DS850. Do not operate the equipment in a damp environment. Store the DS850 in a cool, dry place.

Cleaning

Follow the instructions in the Pre-Election Maintenance section of this manual for cleaning the DS850. Use only the cleaning solutions approved by ES&S. Cleaning instructions are also provided in the ***DS850 System Maintenance Manual***.

Heating

Do not install this product near heat sources such as radiators, air ducts, areas subject to direct sunlight, or other products that produce excessive heat.

Power Cord Protection

Route or install the power supply cord for this product in such a manner to protect it from being walked over or pinched. Make sure you power down the unit completely before connecting or disconnecting the power cord. Before moving the unit, shut down and power off the DS850, and then turn off the UPS. The UPS should be unplugged from the wall outlet and safely stowed before moving. You should take care not to pinch the power cord when locking the power switch access door.

Servicing

Electrical Shock Danger: Do not attempt to service the scanner unless specifically instructed to do so by ES&S. Do not attempt to gain access to areas of the unit where dangerous voltages are present. Only qualified ES&S technicians should service the DS850.

Damage Requiring Service

Unplug the DS850 and call ES&S to consult a qualified service technician under the following conditions:

- When the power cord is damaged.
- If liquid has been spilled into the scanner casing.
- If the scanner does not function normally while following instructions in this manual.
- If the product is damaged in any way.
- When the scanner displays a negative change in performance.

Warning: Adjust only the controls specified in this manual. Improper adjustment of other controls may result in damage to the scanner and could require work by an ES&S technician to restore the scanner to normal operating condition.

Radiation Protection

The DS850 meets or exceeds Federal Communication Commission standards for protection against generated or induced electromagnetic radiation, and no additional safety precautions are required.

Specifications and Cautions

Specifications and Cautions

	Indoor Use Only
	Ordinary Protection (not protected against harmful ingress of moisture)
	The rear door of the DS850 must be locked at all times during normal use. Store the keys to the door in a secure location while you are using the DS850.
WARNING STRICTLY 2 PERSON LIFT	**Weight**: 200 lbs
	Electrical input rating: 120V~ 50/60Hz 8.0A single-phase power or 240V~ 50/60Hz 8.0A dual-phase power. Consult a licensed electrical contractor for proper electrical connections.
	Pollution Degree 2 for the ambient environment
	Operating relative humidity: 10% to 88% RH, non-condensing
	Operating temperature: 50 degrees Fahrenheit to 95 degrees Fahrenheit
	Maintenance: For applicable maintenance items, refer to the *DS850 System Maintenance Manual*.

Specifications and Cautions

	Warning: The interior of the DS850 is not accessible to the user. Service operations inside the electrical enclosure must be done by trained and authorized personnel.
	Transport and storage conditions: -4 degrees Fahrenheit to 140 degrees Fahrenheit

Chapter 3: DS850 User Interface

This chapter describes the DS850 user interface. The screens that make up the DS850 user interface are displayed on the DS850 touch screen. The top-center line of text on each screen identifies the current screen. The menus for the DS850 user interface are listed below and described on the pages which follow.

- Scanning Menu
- Election Menu
- Reports Menu
- System Menu
- Hardware Menu

A menu can be displayed by selecting the corresponding tab along the left side of the screen. See Chapter 11: Menu Structure for diagrams showing the screen hierarchy for each of the menus. The diagrams are intended to help you quickly identify how to access a particular screen.

The date and time are displayed in the upper right-hand portion of each screen. Displayed below the date and time are the icons that indicate the operating status of the DS850. See Operating Status Icons for a description of each icon.

A help menu is available on the DS850. If **Help** is available for the screen that is being displayed, the button will be located in the upper right corner of the screen. Select the **Help** icon to display the help text for that screen and the functions that are performed from that screen.

Unauthorized access to the user interface can be can be prevented by locking the scanner.

Reference: See User Access and Locking the Scanner for more information on preventing unauthorized access to the user interface.

Note: Make sure that the camera lid and rear panel are closed before you attempt to perform any function that engages the DS850's motors, such as scanning ballots, running hardware menu tests, and clearing the transport. The scanner does not allow functions that engage the motors to be performed when the camera lid or rear panel is open.

Operating Status Icons

Described below are the operating status icons that appear in the upper right-hand corner of the screens that are displayed on the scanner's touch screen.

Battery Power - This icon is used for the Uninterruptible Power Supply (UPS). If the scanner is not using a UPS, this icon is not displayed on the screens. If the scanner is plugged into the UPS, the UPS is plugged into a wall outlet, and the UPS is fully charged, then the solid green Battery Power icon appears on the screen. If the UPS is then unplugged from the wall outlet (or the wall outlet loses power,) then the scanner is running off the UPS Battery Backup System, and the icon will change color to indicate the extent to which the battery is charged: Green for 80-100 percent charged, Yellow for 60-80 percent charged, Orange for 40-60 percent charged, and Red for 20-40 percent charged. A message will also appear if the scanner is on/off battery, you will need to press **OK** to clear this message.

AC Power - This icon indicates whether the DS850 is connected to AC power. If the scanner is plugged into the UPS, the UPS is plugged into a wall outlet, and the UPS is fully charged, then the AC Power icon has its two connectors connected. If someone disconnects the UPS from the wall outlet, the AC Power icon has its two connectors separated.

Election Definition - This icon indicates whether an election definition is loaded onto the DS850. An orange check mark in the lower left-hand corner of the icon indicates that an election definition is loaded; a red "X" in the lower left-hand corner indicates that an election definition is not loaded.

Dot Matrix Printer - This icon indicates whether the DS850 is connected to a dot matrix log printer. If there is a red "X" in the lower left-hand corner of the icon, the printer is not connected; otherwise, it is connected.

Laser Printer - This icon indicates whether the DS850 is connected to a laser printer. If there is a red "X" in the lower left-hand corner of the icon, the printer is not connected; otherwise, it is connected.

Scanning Menu

Use the Scanning menu to scan ballots and to clear the ballot transport path.

- Press **Scan Ballots** to begin the ballot scanning process or to select your precinct. See Scanning for additional information on these processes.
- Press **Clear Transport** to clear the ballot transport path.

The following is an example of the Scanning menu.

Election Menu

Use the Election menu to load an election definition, view election setup information, export election results, and to set your scanner configuration options.

The following is an example of the Election menu.

- Press **Configuration** to set your scanner's configuration options. See Configuring the Scanner for information on setting your scanner's configuration options.
- Press **Results** to access the Results screen. From the Results screen, you can export the poll place collection data, the election definition and the audit log. The Results screen is also used to clear election results. You can clear all election results or the election results for only a selected precinct.

Reference: See Exporting Data and Clearing Election Results for more information on the Results screen.

- Press **Setup** on the Election menu to view election setup and ballot count information, clear and initialize the scanner, and load an election definition.

Reference: See Clearing and Initializing the Scanner and Loading the Election Definition for more information on the Setup screen.

Reports Menu

Use the Reports menu to print or preview reports. See Chapter 8: Reports for additional information on the various reports that are available and for the steps to follow to preview or print the reports.

The following is an example of the Reports menu.

System Menu

The System menu lists the following options:

- Set Date/Time
- Firmware
- Antivirus
- User Access

The following is an example of the System menu.

Set Date/Time

The Set Date/Time option allows you to change the date, time, or both on the DS850.

Note: The scanner's date and time settings cannot be changed when the scanner contains ballot data.

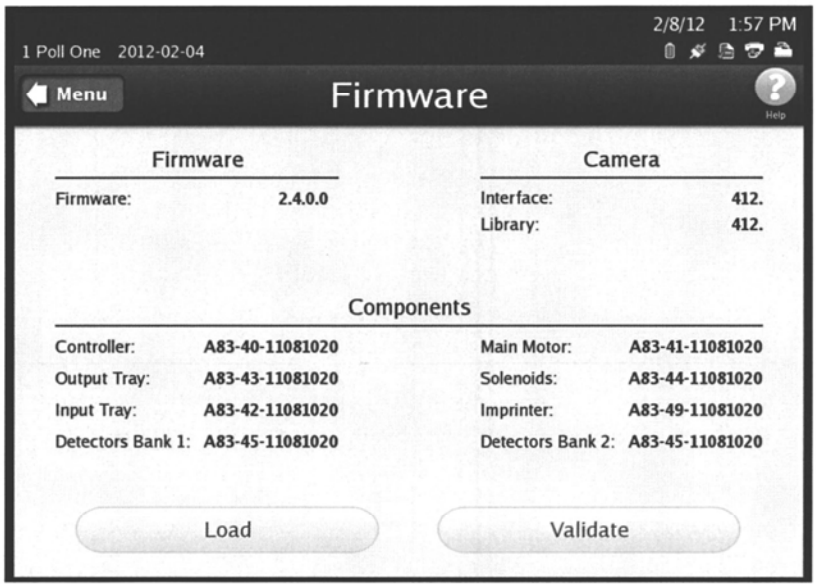
Reference: See Setting the Date/Time for the steps that must be taken to change the scanner's system date and time.

Firmware

Press **Firmware** on the System menu to access the Firmware screen. On the Firmware screen, you can see the version of the firmware loaded onto the DS850 and other information about the machine.

Reference: For detailed instructions on loading new firmware, refer to the *ES&S DS850 System Maintenance Manual*.

The following is an example of the Firmware screen.



Note: The **Load** and **Validate** buttons refer to future functionality that is not currently available on the DS850.

Antivirus

Note: This section refers to future functionality that is not currently available on the DS850.

User Access

When an election definition is loaded into the scanner, the firmware on the DS850 sets the User Access feature to enabled. When User Access is enabled, a user can lock the scanner. When the scanner is locked, no function can be performed from the touch screen, such as modifying configuration settings or scanning ballots, until the Election Code is entered and the scanner is unlocked. Once an election definition has been loaded, you can disable the User Access feature from the User Access screen, if you wish to do so. When User Access is disabled, the scanner cannot be locked.

Reference: See Locking the Scanner for the steps that must be followed to lock the scanner.

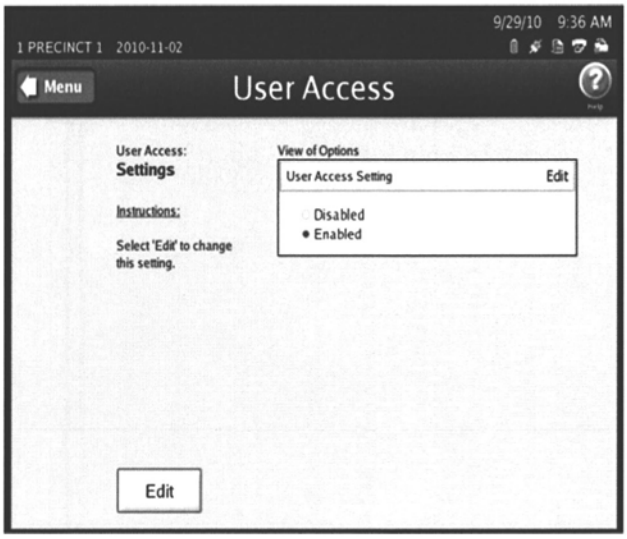
If an election definition has been loaded, the User Access setting determines the screen that is displayed when the scanner is started. If an election definition has been loaded and User Access is enabled, the Startup screen is displayed when the scanner is started. If an election definition has been loaded and User Access is disabled, the Scan Ballots screen is displayed when the scanner is started. (If an election definition has not been loaded, the Setup screen is displayed when the scanner is started.)

Reference: See Starting the Scanner for the steps to follow to start the scanner.

Follow the steps listed below to change the User Access setting:

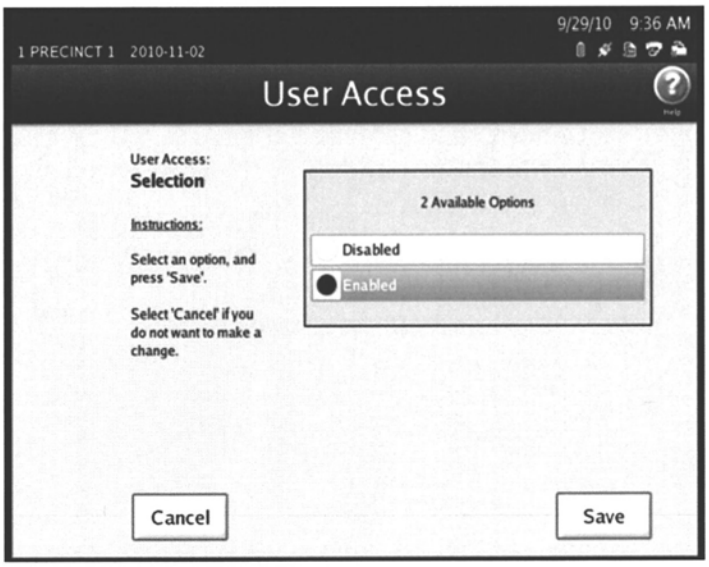
1. Press **User Access** on the System menu to display the User Access settings screen.

Note: If an election definition has not been loaded onto the scanner and you press **User Access** on the System menu, a pop-up screen will appear indicating that an election must be loaded in order to access this screen.



2. Press **Edit** on the User Access settings screen to change the user access setting.
3. When prompted, enter the Administration Code and press **Accept**.

4. When the User Access selection screen appears, highlight the desired option (Disabled or Enabled) by pressing on it. Then press **Save** to save the change, or press **Cancel** to cancel it.



Hardware Menu

The Hardware menu lists the following options:

- Screen Calibration
- Printers
- Audio
- Camera
- Transport

The following is an example of the Hardware menu.

Screen Calibration

Press **Screen Calibration** to calibrate the scanner's touch screen.

Reference: Refer to the *ES&S DS850 System Maintenance Manual* for further information on calibrating the scanner's touch screen.

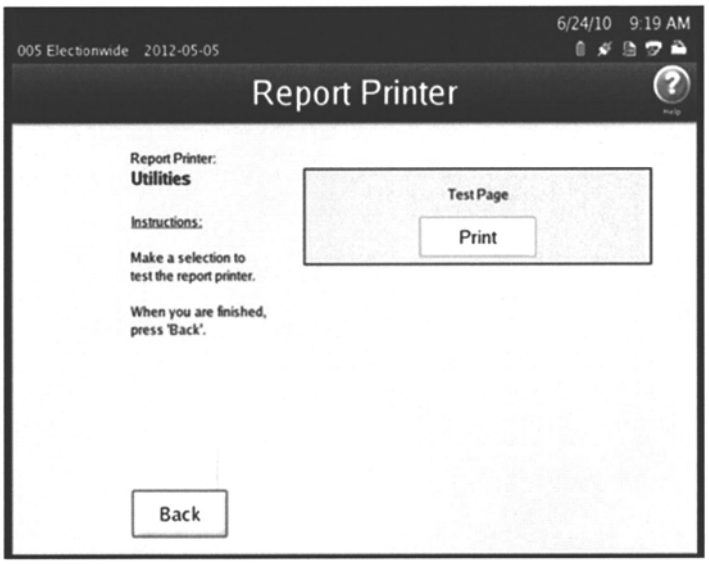
Printers

The Printers option on the Hardware menu allows you to print test pages on the report and log printers.

Follow the steps below to print test pages on these printers:

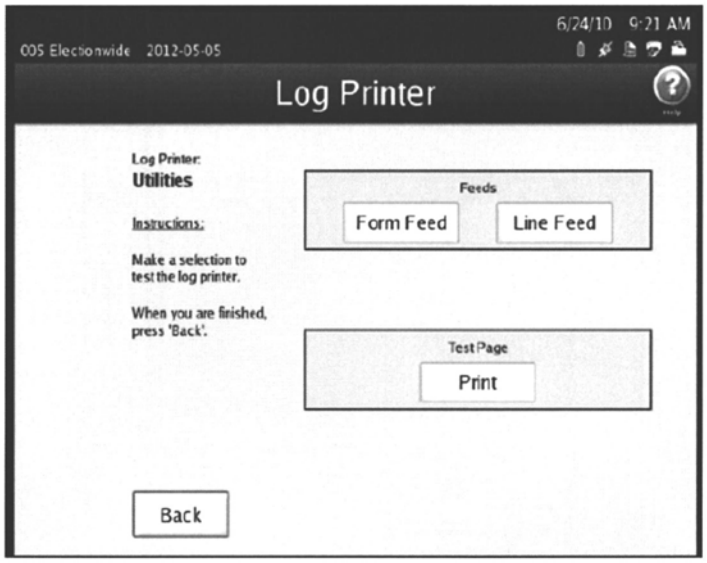
1. From the Hardware menu, press **Printers**.
2. When the Printers screen appears, press either **Report Printer** or **Log Printer**.

If you select Report Printer, the Report Printer screen appears. On the Report Printer screen, press **Print** to print a test page on the report printer. When you are finished, press **Back**.

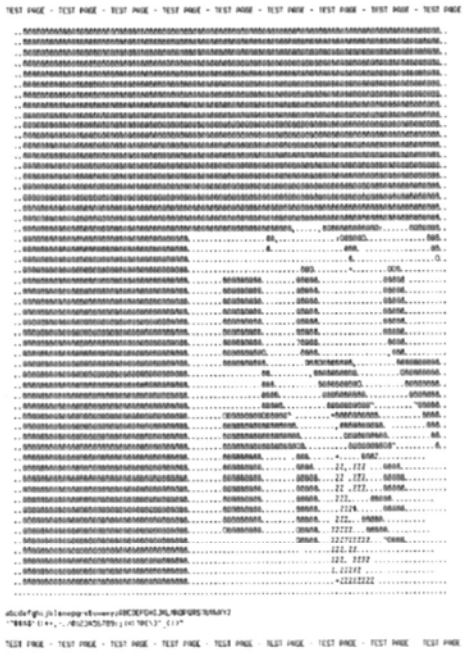


A test page, similar to the one below, prints from the report printer:

If you select Log Printer, the Log Printer screen appears. On the Log Printer screen, use the **Form Feed** and **Line Feed** buttons to advance the paper in the log printer to the point at which you want printing to begin. Then press **Print** to print the test report on the log printer. When you are finished, press **Back**.



A test page, similar to the one below, prints from the log printer:



Audio

Note: This section refers to future functionality that is not currently available on the DS850.

Camera

From the Camera screen, you can calibrate the camera and adjust the camera's threshold, adaptive tolerance, and despeckle settings. These tasks should only be performed by trained personnel.

Reference: See the *ES&S DS850 System Maintenance Manual* for more information on the tasks that can be performed from the Camera screen.

Transport

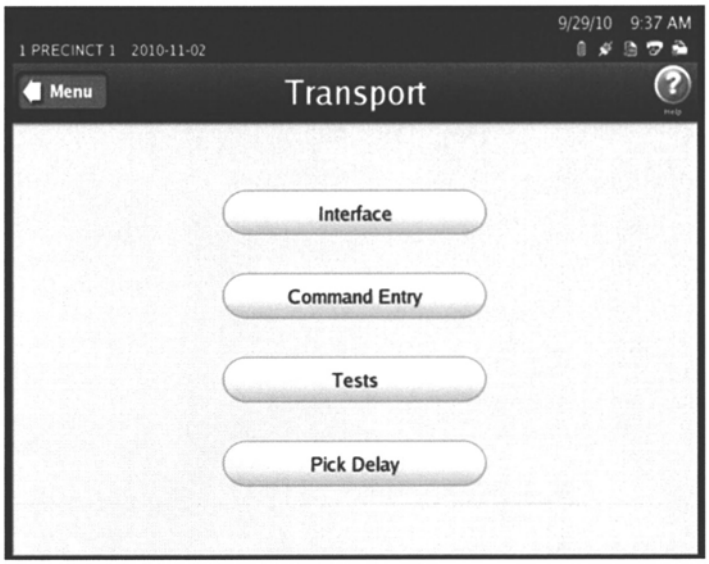
From the Transport screen, you can set the ballot transport settings, as well as exercise individual components of the DS850 transport. The Transport screen lists the following options:

- Interface
- Command Entry
- Tests
- Pick Delay

Follow the steps below to access the Transport screen:

1. Press **Transport** on the Hardware menu.
2. When prompted, enter the Administration Code.

After you successfully enter the Administration Code, the Transport screen is displayed.



Warning: Adjustments to ballot transport settings should only be made by trained technicians.

Interface

The Interface screen lists the following options:

- Sensor Status
- Pick One Ballot
- Trays
- Motors
- Diverters
- Export Log

The following is an example of the Interface screen.

Sensor Status

Note: This section refers to future functionality that is not currently available on the DS850.

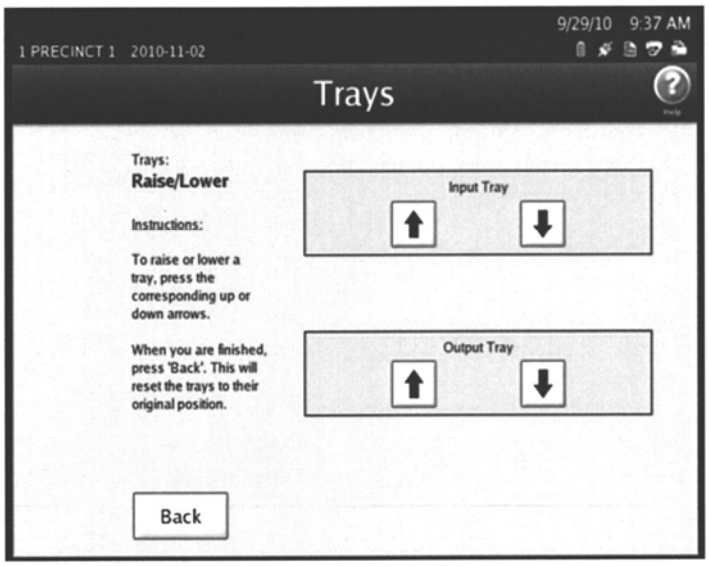
Pick One Ballot

Note: This section refers to future functionality that is not currently available on the DS850.

Trays

Use the Trays option to raise or lower the input tray or the bottom output tray. Press **Trays** on the Interface screen to display the Trays screen. Press the up arrow in the **Input Tray** field to raise the input tray, or press the down arrow in that field to lower it. Press the up arrow in the **Output Tray** field to raise the bottom output tray, or press the down arrow in that field to lower it. When you are finished, press **Back**. The DS850 will reset itself, which clears the paper path and returns the trays to their original positions.

The following is an example of the Trays screen.



Motors

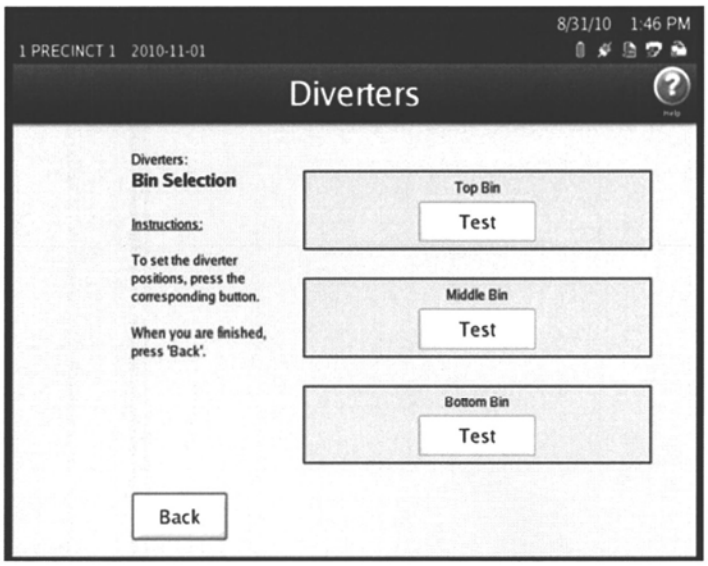
Use the Motors option to start and stop the DS850's transport motors. Press **Motors** on the Interface screen to display the Motors screen. In the **Transport Motors** field on the Motors screen, press **Start** to start the transport motors, or press **Stop** to stop the transport motors. When you are finished, press **Back**.

The following is an example of the Motors screen.

Diverters

Press **Diverters** on the Interface screen to display the Diverters screen. On the Diverters screen, press **Test** on the **Top Bin, Middle Bin,** and **Bottom Bin** fields to flip the position of the corresponding diverters. When you are finished, press **Back**. The DS850 will reset itself, which clears the transport path.

The following is an example of the Diverters screen.



Export Log

Use the Export Log option to export the interface log to a blank ES&S Media Device flash drive, if this report is requested by ES&S Technical Support.

Note: The Export Interface Log is used by highly skilled engineers and technicians to analyze the operation of the BAP Image Systems (BAPis) interface to the camera on the DS850.

Follow the steps listed below to export the contents of the interface log to a USB flash drive:

1. Insert a blank ES&S Media Device flash drive into one of the USB ports on the DS850.

2. On the Interface screen, press **Export Log**. The following is an example of the screen that is displayed when the interface log has been exported successfully.

3. Remove the ES&S Media Device flash drive, and then press **Done** to close the Export Interface Log screen.

Command Entry

Use the Command Entry screen to manually send commands to the transport.

Follow the steps below to send a command via the Command Entry screen:

1. Press **Command Entry** on the Transport screen.
2. When the Command Entry screen appears, enter a Command code in the text box and press **Send** to manually send the command.

Warning: Use of this screen should be limited to ES&S Certified Technicians. See the *ES&S DS850 System Maintenance Manual* for additional information.

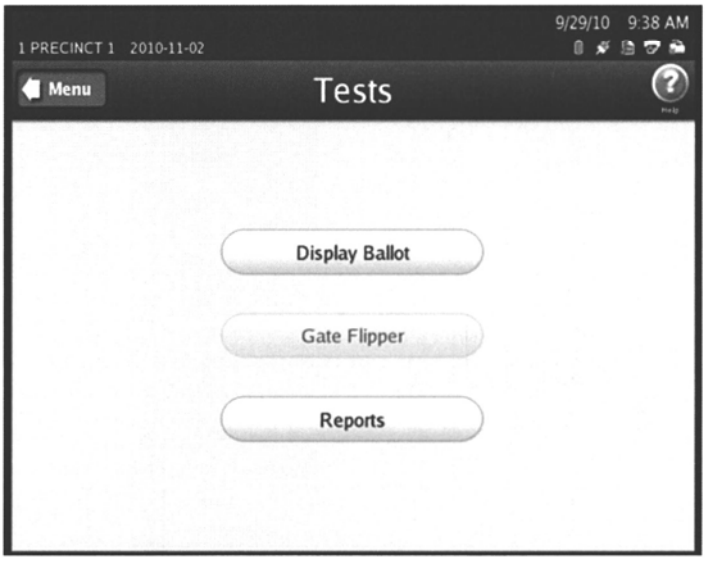
The following is an example of the Command Entry screen.

Tests

Use the Tests screen to display the last saved ballot and to print the Mark Code and Digital Readings reports. To access the Tests screen, press **Tests** on the Transport screen. The Tests screen lists the following options:

- Display Ballot
- Gate Flipper
- Reports

The following is an example of the Tests screen.

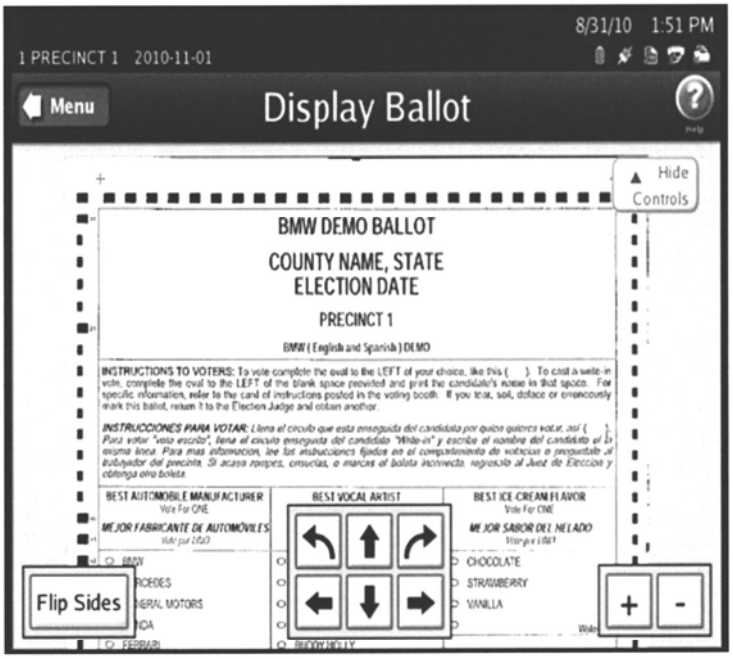


Display Ballot

Press **Display Ballot** on the Tests screen to display the last ballot scanned and saved on the DS850.

The following is an example of a displayed ballot.

- Use the **Flip Sides** button to view the other side of the displayed ballot.
- Use the arrow buttons to position the ballot on the screen.
- Use the button with a plus sign (+) to zoom in; use the button with a minus sign (-) to zoom out.
- Use the **Hide Controls** button to hide the **Flip Sides**, arrow, and zoom buttons. When you press the **Hide Controls** button, it becomes the **Show Controls** button. Press the **Show Controls** button to re-display the **Flip Sides**, arrow, and zoom buttons.



Gate Flipper

Note: This section refers to future functionality that is not currently available on the DS850.

Reports

Use the reports option to print the following reports:

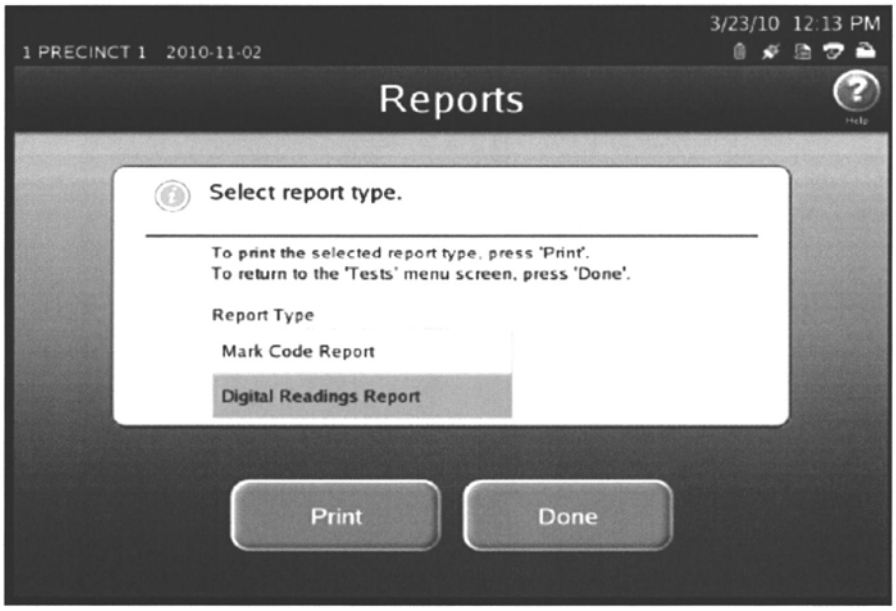
- Mark Code - contains the mark code data from the scanner's image processor for the last ballot scanned and saved on the scanner.
- Digital Readings - contains the reading data from the scanner's image processor for the last ballot scanned and saved on the scanner.

Note: ES&S Techncians use these reports to analyze scanner performance.

Note: If the last ballot scanned was out-stacked, then the Mark Code and Digital Readings reports will not work because a ballot image was not saved for the last ballot scanned.

- Follow the steps below to print the Mark Code or Digital Readings report:

1. Press **Reports** on the Tests screen to display the Reports screen.



2. On the Reports screen, highlight the desired report by pressing on the report title and then press **Print**.

Note: The Zero, Results, Batch/Bin, Precincts Processed, and System Readiness reports are not available from this Reports screen. They are printed from the Reports menu. See Chapter 8: Reports for more information on accessing and printing those reports.

3. Press **Done** when you are finished printing reports.

Example of Mark Code Report

Contact ES&S Support with any questions about this report or any other items that are on this report.

Page 1 of 2
Ballot Number: 0007000001
Rows: 36
Columns: 3
IMR Filter Values: 25, 20

Side 1	_1_	_2_	_3_
_1_	-	-	-
_2_	V99	V99	V99
_3_	I-1	I-1	I-1
_4_	V99	V99	V99
_5_	I-1	I-1	I-1
_6_	V99	V99	V99
_7_	I-1	I-1	I-1
_8_	V99	V99	V99
_9_	I-1	I-1	I-1
_10_	V99	V99	V99
_11_	I-1	I-1	I-1
_12_	V99	V99	V99
_13_	I-1	I-1	I-1
_14_	V99	V99	V99
_15_	I-1	I-1	I-1
_16_	V99	V99	V99
_17_	I-1	I-1	I-1
_18_	V99	V99	V99
_19_	I-1	I-1	I-1
_20_	V99	V99	V99
_21_	I-1	I-1	I-1
_22_	V99	V99	V99
_23_	I-1	I-1	I-1
_24_	V99	V99	V99
_25_	I-1	I-1	I-1
_26_	V99	V99	V99
_27_	I-1	I-1	I-1
_28_	V99	V99	V99
_29_	I-1	I-1	I-1
_30_	V99	V99	V99
_31_	I-1	I-1	I-1
_32_	V99	V99	V99
_33_	I-1	I-1	I-1
_34_	V99	V99	V99
_35_	I-1	I-1	I-1
_36_	V99	V99	V99

M - Marginal
V - Vote
I - Ignore

Example: -1 no mark

Example: 99 is dark enough to be considered a mark.

Example of Digital Readings Report

Contact ES&S Support with any questions about this report or any other items that are on this report.

Page 1 of 2
Ballot Number: 0007000001
Rows: 36
Columns: 3
IMR Filter Values: 25, 200

Side 1	_1_	_2_	_3_
_1_	-	-	-
_2_	494	494	494
_3_	0	0	0
_4_	494	494	494
_5_	0	0	0
_6_	494	494	494
_7_	0	0	0
_8_	494	494	494
_9_	0	0	0
_10_	494	494	494
_11_	0	0	0
_12_	494	494	494
_13_	0	0	0
_14_	494	494	494
_15_	0	0	0
_16_	494	494	494
_17_	0	0	0
_18_	494	494	494
_19_	0	0	0
_20_	494	494	494
_21_	0	0	0
_22_	494	494	494
_23_	0	0	0
_24_	494	494	494
_25_	0	0	0
_26_	494	494	494
_27_	0	0	0
_28_	494	494	494
_29_	0	0	0
_30_	494	494	494
_31_	0	0	0
_32_	494	494	494
_33_	0	0	0
_34_	494	494	494
_35_	0	0	0
_36_	494	494	494

Number of black pixels found in the oval. ("0" is an empy oval)

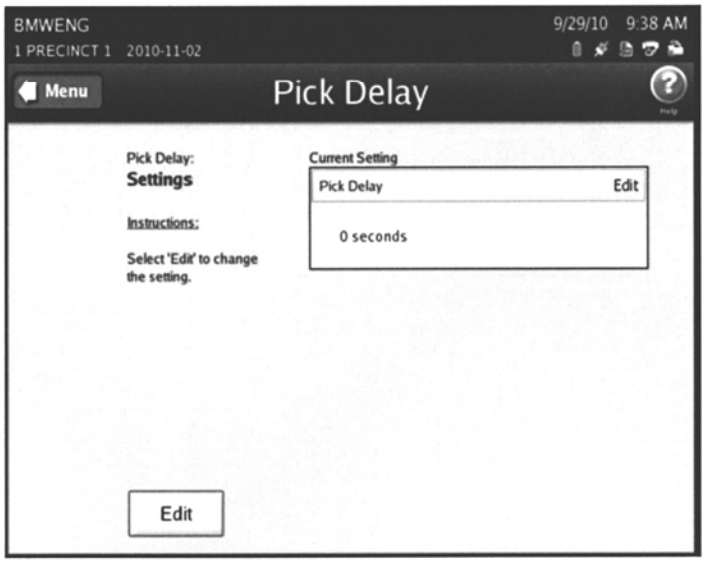
Pick Delay

The Pick Delay option is used to change the number of ballots that are picked for scanning in a given period of time. The value in the Pick Delay field specifies the number of seconds that the pick mechanism waits before grabbing the next ballot from the input tray. For example, if the pick delay is set to 15 seconds, only four ballots will be picked for scanning in one minute.

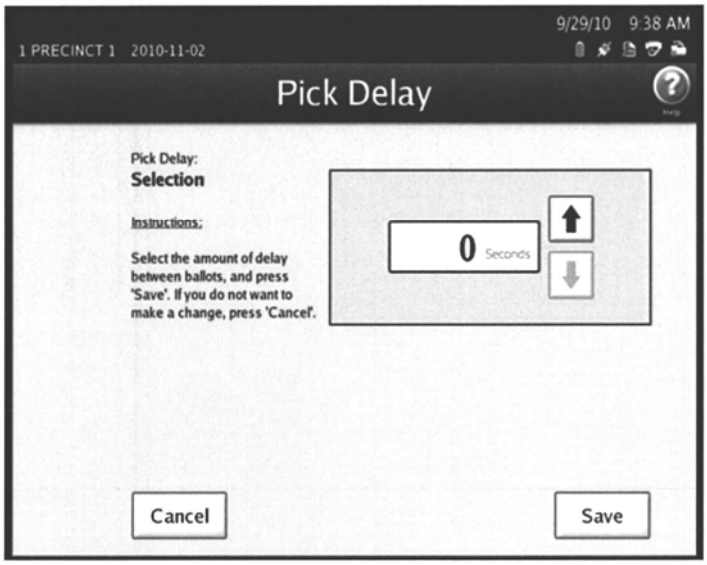
Increasing the pick delay value reduces the number of ballots that are picked for scanning in a given period of time; decreasing the pick delay value increases the number of ballots that are picked for scanning in a given period of time.

Follow the steps below to change the DS850's pick delay setting:

1. Press **Pick Delay** on the Transport screen.
2. When the Pick Delay settings screen appears showing the current pick delay setting, press **Edit**.



3. When the Pick Delay selection screen appears showing the current setting and the up and down arrows, press the up arrow to increase the pick delay, or press the down arrow to decrease the pick delay. The numbers change more quickly if you hold down on the up or down arrow. The maximum pick delay is 30 seconds.



4. After you select a new pick delay, press **Save** to save the new setting, or press **Cancel** to cancel the change.

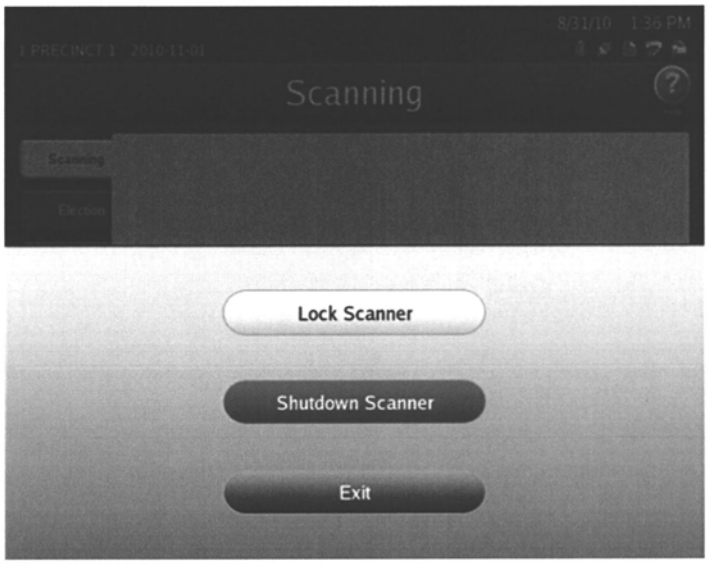
Locking the Scanner

If an election definition has been loaded on the scanner and if User Access is enabled, you can lock the scanner to prevent unauthorized users from modifying the scanner configuration or performing other scanner functions from the touch screen.

Follow the steps listed below to lock the scanner:

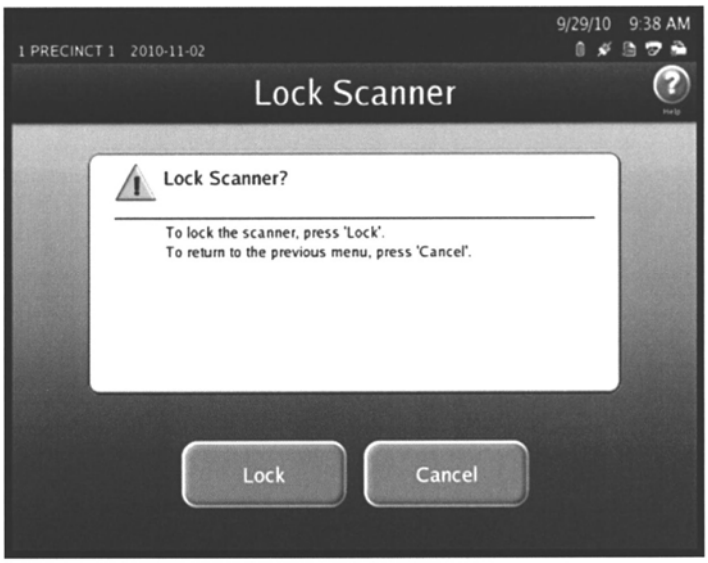
1. Press **Exit** in the lower left-hand corner of the screen to display the Exit screen.

2. From the Exit screen, press **Lock Scanner** to access the Lock Scanner screen



Note: If an election definition is not loaded or if User Access is disabled, the Exit screen does not include the **Lock Scanner** button. See the User Access section for information on enabling and disabling User Access.

3. On the Lock Scanner screen, press **Lock** to lock the scanner, or press **Cancel** to leave the scanner unlocked. If you press **Lock**, the Scanner Locked screen appears. See the steps below for an example of the Scanner Locked screen.



Follow the steps below to unlock a locked scanner:

4. From the Scanner Locked screen, press **Unlock**.

5. When prompted, enter the Election Code and then press **Accept**.

If you press **Exit** on the Exit screen, the Exit screen closes and the Scanning menu is displayed.

Reference: See Shut Down and Power Off the Scanner for an explanation of how the **Shutdown Scanner** button on the Exit screen is used.

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Part 2: Election Tasks

This part of the manual contains instructions for the tasks that must be performed before, on, and after Election Day. It includes the following chapters:

- Chapter 4: DS850 Election Workflow
- Chapter 5: Pre-Election Day Tasks
- Chapter 6: Election Day Tasks
- Chapter 7: Post-Election Day Tasks

Chapter 4: DS850 Election Workflow

The following is the DS850 election workflow. Click on the hyperlinks to view additional information on the referenced steps.

1. Perform the Pre-Election Maintenance.
2. Install the UPS; see Installing the UPS.
3. Connect the scanner to the UPS; see Connecting the Scanner to the UPS.
4. Connect the printers to the scanner and the UPS; see Connecting the External Printers.
5. Set up the printers; see Setting Up the Audit Log Printer and Setting Up the Report Printer.
6. Turn on the UPS; see Turning On the UPS.
7. Power on the printers and the scanner; see Starting the Scanner.
8. Clear and initialize the scanner; see Clearing and Initializing the Scanner.
9. Load the election definition; see Loading the Election Definition.
10. Perform Logic and Accuracy Testing to verify that the DS850 properly reads ballot marks.
11. Make any desired modifications to the processing mode, bin sorting, audit log printing, and batch/bin reporting configuration options; see Configuring the Scanner.
12. Place the ballots on the input tray and begin scanning ballots; see Scanning.
13. After you have finished scanning the ballots, you can print reports; see Printing Election Reports. You can also export election results, ballot images, and the audit log; see Exporting Data.
14. When you are finished printing reports and exporting data, you can clear the election results; see Clearing Election Results
15. When the election results have been cleared, perform the post-Election scanner and UPS maintenance tasks; see Perform Scanner Maintenance and Perform UPS Maintenance.
16. When the post-Election maintenance tasks have been completed, shut down and power off the scanner; see14. Follow manufacturer recommendations for environmental storage conditions for all your election materials. (See Specifications and Cautions for storage requirements of the DS850)..
17. After the scanner has been shut down and powered off, turn off the UPS; see Turn Off the UPS.

Chapter 5: Pre-Election Day Tasks

This chapter describes the tasks that must be performed to prepare the UPS, printers, and scanner for scanning ballots on Election Day. It provides instructions for performing the following preparatory tasks:

- Pre-Election Maintenance
- Installing the UPS
- Connecting the Scanner to the UPS
- Connecting the External Printers
- Setting Up the Audit Log Printer
- Setting Up the Report Printer
- Turning On the UPS
- Starting the Scanner
- Checking the Connection Between the UPS and the Scanner
- Clearing and Initializing the Scanner
- Loading the Election Definition
- Setting the Date/Time
- Logic and Accuracy Testing
- Configuring the Scanner

Pre-Election Maintenance

In order to keep the scanner in working order, perform routine maintenance before each election. Before performing the following maintenance steps, ES&S recommends that the unit be fully powered off using the proper shutdown procedures. Maintenance to any component inside the scanner requires that the power plug be unplugged from the scanner. Such maintenance should be done only by trained technicians.

Warning: Make sure you power the scanner down completely and power off and unplug the UPS before connecting or disconnecting the power cable. Remove the power cord before moving the scanner. Place the power cord near an easily accessible unobstructed power outlet.

Clean the Rollers

Required Tools: Dry cotton cloth, isopropyl alcohol
Required Staff: Personnel trained by ES&S
Required Time: 30 minutes

The rollers move each ballot, picked from the input tray, over the transport path, through the scan area (upper and lower camera housing), and into one of the three output bins (the top, middle, or bottom bin). If the surfaces of the rollers are dirty or discolored, clean them.

To clean the rollers, apply isopropyl alcohol to a cotton cloth and clean the visible surfaces of the rollers, turning them as you clean to expose most of the surface area of the rollers.

Caution: Keep fingers, hands, and loose clothing clear of the rollers.

Clean the Cameras

Required Tools: Dry cotton cloth, pressurized air can
Required Staff: Personnel trained by ES&S
Required Time: 5 minutes

To clean the cameras, wipe them with a dry, cotton cloth, or use a pressurized air can to clean out any debris or paper dust collected during scanner operation. It is important to hold the can upright so that you do not expel propellant onto the sensors.

Clean the Scanner Case

Required Tools: Soft cotton cloth, mild detergent solution
Required Staff: Personnel trained by ES&S
Required Time: 5 minutes

Warning: Before cleaning the scanner case, disconnect the unit from its power source. Do **NOT** use full strength or harsh detergents, liquid cleaners, aerosols, abrasive pads, scouring powders, or solvents, such as benzene or alcohol. Liquids should never be applied directly to the scanner. Use a soft cotton cloth lightly moistened with a mild detergent solution. Ensure that the surface cleaned is fully dry before reconnecting the power.

Clean the Touch Screen

Required Tools: ES&S touch screen cleaning kit
Required Staff: Personnel trained by ES&S
Required Time: 5 minutes

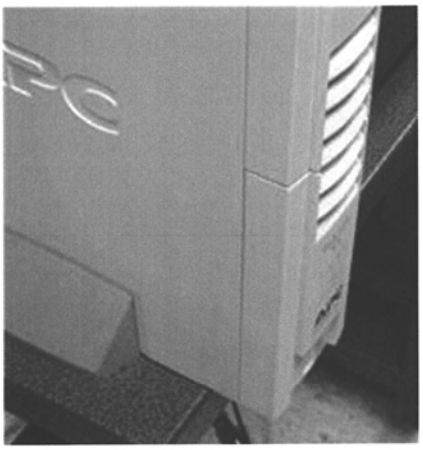
Spray the cloth with the cleaning solution and gently wipe the screen until clean. Then use a dry section of the cloth to dry any remaining cleaning solution from the screen.

Installing the UPS

Installation of the UPS involves connecting the bottom battery connector to the top battery connector.

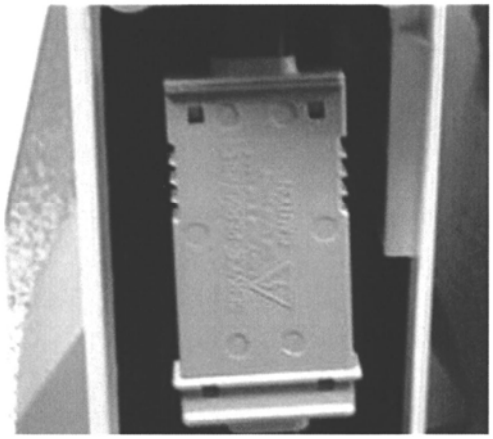
Follow the steps below to install the UPS:

1. Move the UPS so that the front panel of the UPS hangs over the edge of the table as shown in the picture on the right.



2. Press down on the front panel and then slide it off as shown in the picture on the right.

3. Insert the bottom battery connector into the top battery connector. The picture below on the left shows the two connectors before they are connected; the picture below on the right shows the two connectors after they have been connected.



4. Replace the front panel.
5. Move the UPS to the spot where you want it to be when the scanner is operating.
6. Plug the UPS into a power outlet.

Connecting the Scanner to the UPS

Plug one end of the DS850's power cord into the left side of the DS850, just below the power switch. Plug the other end of the power cord into one of the bottom receptacles on the UPS that provides battery backup. Connect the data communication cable to the UPS and one of the USB ports on the DS850. The data communication cable is used by the UPS to let the DS850 know when the UPS is operating on battery power.

Connecting the External Printers

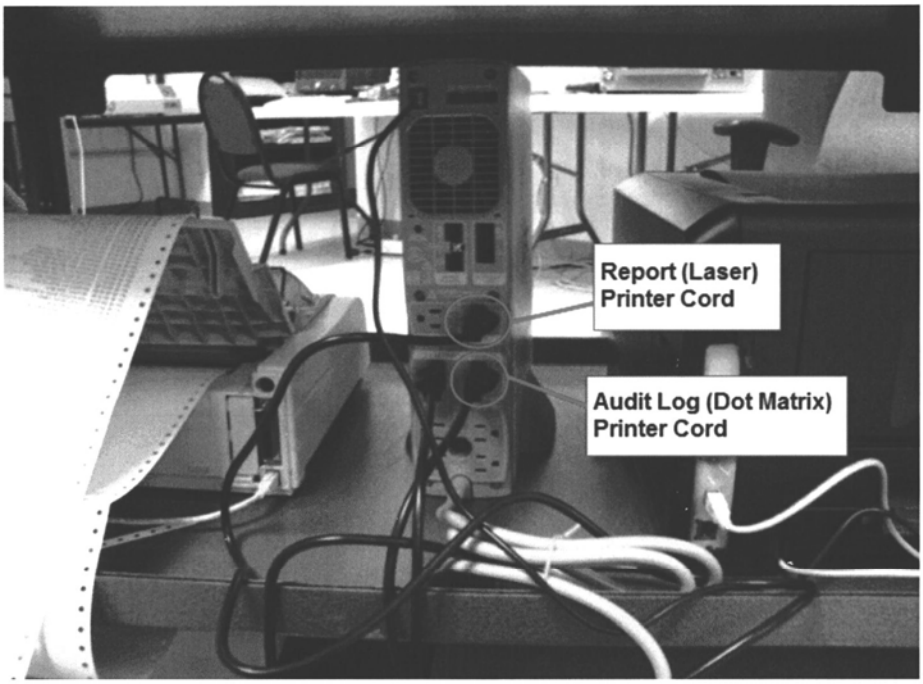
The DS850 uses a dot matrix printer to print the continuous audit log and a laser printer for printing reports. Both printers can be attached to any USB connection on the side of the scanner. ES&S recommends that the printers be connected to the USB port next to the power switch on the left side of the scanner. This will allow the security door to be closed after connecting the printers. In addition, the audit log printer power cord should be connected to the battery backup power of the UPS, and the report printer power cord should be connected to the UPS power jack that has surge protection only. Connecting the laser printer power cord to the battery backup of the UPS will overload it.

Reference: Refer to the printer manuals for specific instructions on operating the printers.

Follow the steps below to connect the external printers:

1. Plug the printer cables into the external USB printer ports located next to the power switch on the left side of the scanner.
2. Plug the other end of the printer cables into the printer ports on the back oLf the printers.
3. Connect one end of the printer's power cords to the backs of the printers.

4. Connect the other end of the printers' power cords to the UPS as shown below.

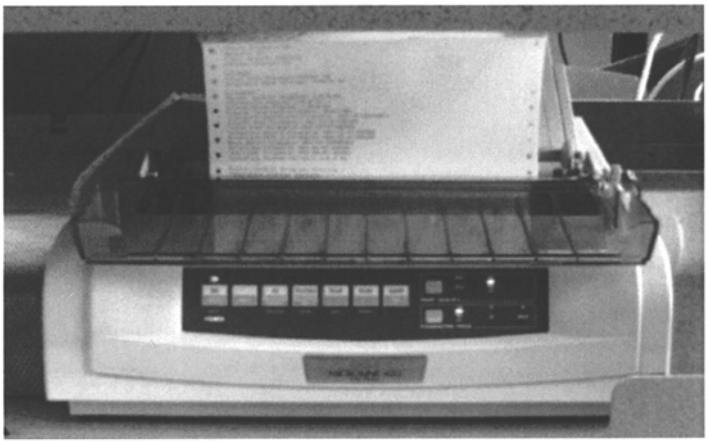


Note: The power cord from the audit log printer should be connected to the battery backup power of the UPS, and the power cord from the report printer should be connected to the UPS power jack that has surge protection only.

Setting Up the Audit Log Printer

The dot matrix printer is used to print the continuous audit log. Before using the printer, make certain that there is pleny of paper in the printer and that the printer is connected to the UPS and powered on.

The following is an example of a dot matrix printer.



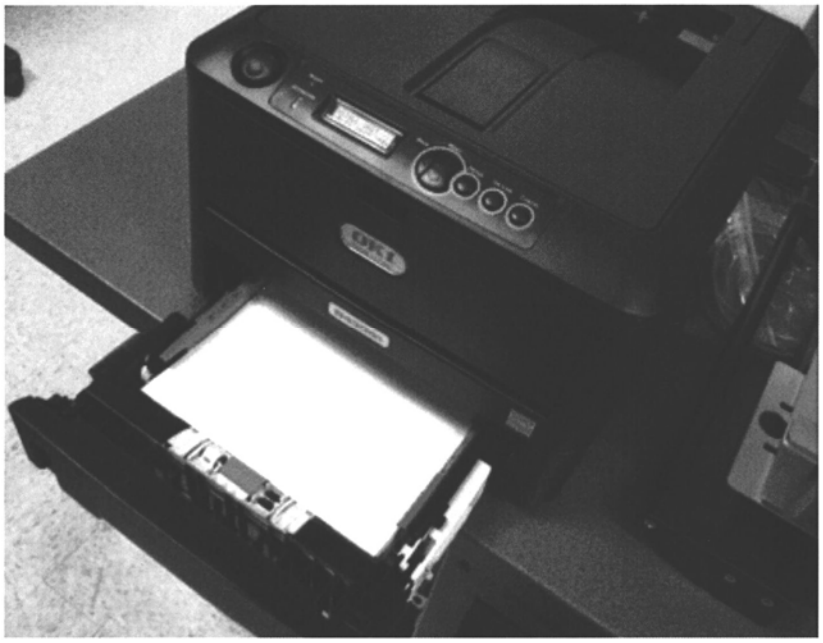
Follow the steps below to configure the dot matrix printer using the buttons on the front panel of the printer:

1. Verify that there is plenty of paper in the printer.
2. Verify that the printer is powered on.
3. Press and hold **SHIFT** and then press **SEL** to enable the menu.
4. Release **SHIFT**.
5. Press **LF**. The printer control emulation is displayed on the printer.
6. Press **TEAR** repeatedly until the "Epson FX" mode prints.
7. Press and hold **SHIFT**, and then press **SEL** to save the setting.

Setting Up the Report Printer

The laser printer is used to print reports. Before using the printer, make certain that the printer is connected to the power jack that has surge protection only on the UPS, there is paper in the printer and it is powered on.

The following is an example of a laser printer.



Turning On the UPS

Before turning on the UPS, make sure that the UPS is plugged into a power outlet. Then press the power switch, as shown in the picture below. The green light visible at the top of this unit indicates that the UPS is powered on and that utility power is powering battery backup outlets.

Note: The first time the UPS is powered up, it will take eight hours for it to reach its full charge.

Starting the Scanner

To start the scanner, flip the power switch on the left side of the DS850 to the on position. A pop-up screen will display telling you to touch the screen if you want to calibrate it. The next screen that displays depends on whether an election definition has been loaded into the DS850, and if an election definition has been loaded, whether User Access is enabled or disabled.

- If an election definition has not been loaded on the scanner, the screen that appears when the scanner is started is the Setup screen. The Setup screen allows you to either clear and initialize the scanner or load an election definition. The following is an example of the Setup screen.

Reference: See Clearing and Initializing the Scanner and Loading the Election Definition for the steps to follow to perform these procedures.

- If an election definition has been loaded on the scanner and User Access is enabled, the screen that appears when the scanner is started is the Startup screen. From the Startup screen, press **Login** if you are ready to scan ballots for the loaded election, press **Setup** to load a different election definition, or press **Shutdown** to shut down the scanner. The following is an example of the Startup screen.

If you press **Login** from the Startup screen, you will be prompted to enter the Election Code. Enter the Election Code and then press **Accept**. The next screen that is displayed is the Scan Ballots screen.

- If an election definition has been loaded on the scanner and User Access is disabled, the screen that appears when the scanner is started is the Scan Ballots screen. If you are ready to scan ballots, place the ballots in the input tray and press **Start**. The following is an example of the Scan Ballots screen.

Note: If the election is **By Style** or if the Processing Mode is set to **Single Precinct**, you will have to select a precinct before you can begin scanning the ballots. See Select a Precinct for more information. If the Processing Mode is set to **Mixed Precinct**, you will not need to select a precinct before you can scan ballots. The **Select Precinct** button will be the only available button until you select a precinct.

Reference: See Scanning for the steps to follow to perform the procedure. See Select a Precinct for instructions on selecting a precinct.

Select a Precinct

If an election is **By Style** or if the Processing Mode is set to **Single Precinct**, you must select a precinct before you can scan ballots.

Follow the steps below to select a precinct:

1. Press **Select Precinct**

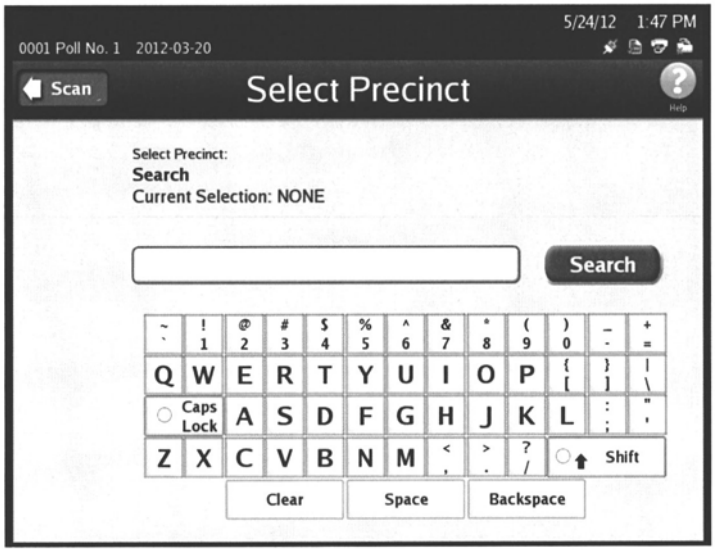
Reference: See Scanning for an example of the Scan Ballots screen showing the **Select Precinct** button.

2. Enter the precinct number or name and then press **Search** or just press **Search**.

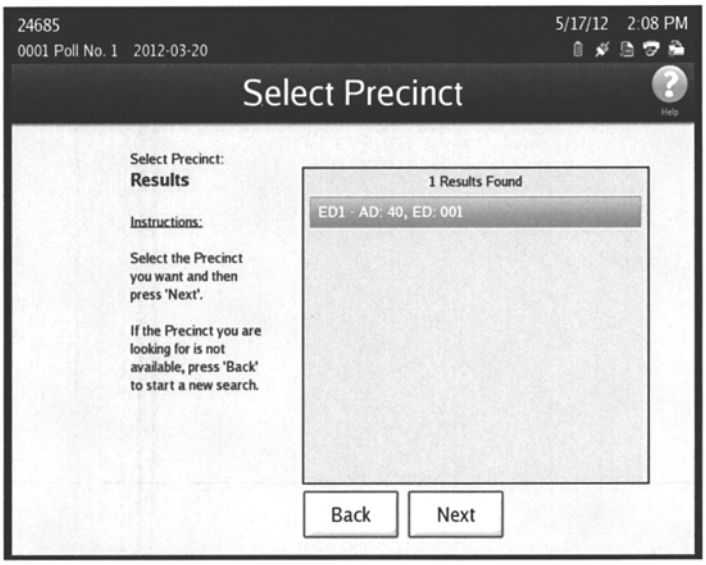
   - You can enter the precinct name or the first few letters of the precinct to narrow your search. Use the keyboard to type in the first few letters, numbers or the precinct name then press **Search**. Then go to **Step 3**.

Note: You do not have to enter a precinct number or name in the search field in order to perform a search. You can leave the field blank and press **Search**. Entering a number in the field simply helps to narrow the search.

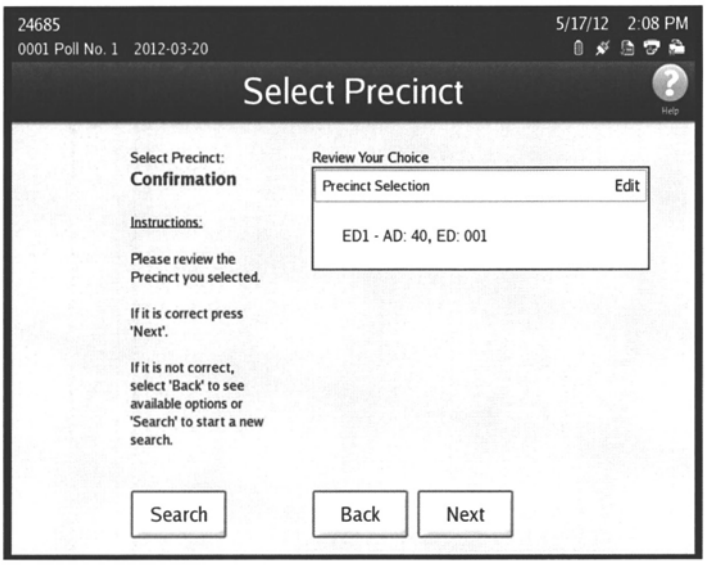
- You can also search the entire list of precincts on the DS850 by selecting **Search .** Then go to **Step 3**.



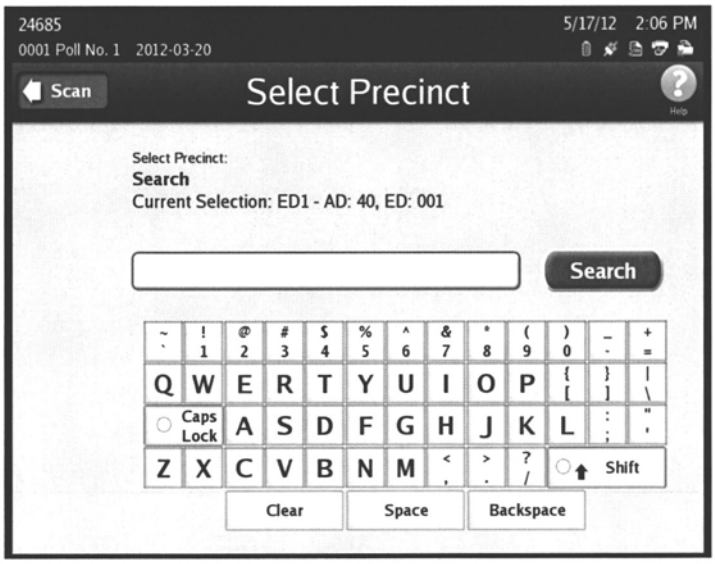
3. The Select Precinct results screen appears. Select the desired precinct by pressing on it and then press **Next**. If the precinct you want to select is not listed, press **Back** to perform another search.



4. The Select Precinct confirmation screen appears, press **Next** to confirm your selection. If you are not satisfied with your selection, press **Back** to review the list of search results, or press **Search** to start a new search.



Once you have selected the correct precinct and pressed **Next**. You will be returned to the Select Precinct screen. Under Current Selection, it will show theprecinct you selected. i



Checking the Connection Between the UPS and the Scanner

The DS850 uses a USB connection to the UPS so that the DS850 can detect when external power is lost to the UPS.

Follow the steps below to test the UPS:

Note: These steps assume that the scanner has been connected to the UPS, the UPS has been turned on, the scanner has been powered on, and the AC Power icon indicates that external power is being applied to the UPS.

Reference: See Connecting the Scanner to the UPS, Turning On the UPS, and Starting the Scanner to verify the assumptions listed in the note above.

1. Disconnect external power from the UPS.
2. Verify the DS850 screen indicates that external power has been lost. (The two connectors in the AC Power icon should be disconnected.)
3. Reconnect external power to the UPS.

4. Verify that the screen indicates external power has been applied. (The two connectors in the AC Power icon should be connected.)

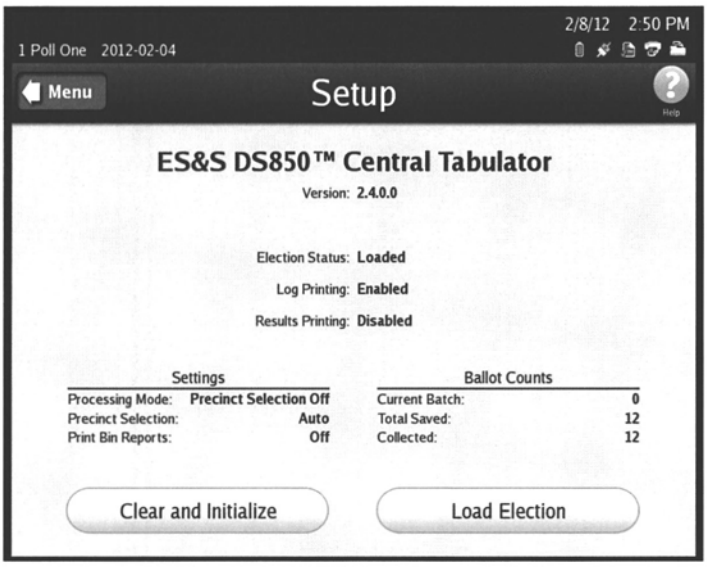
Reference: See Operating Status Icons for more information on the AC Power icon.

Clearing and Initializing the Scanner

You must clear and initialize the DS850 prior to loading the election definition. The clear and initialize process clears all data from the machine and loads the necessary encryption keys to load and run the election.

Follow the steps below to clear and initialize the scanner:

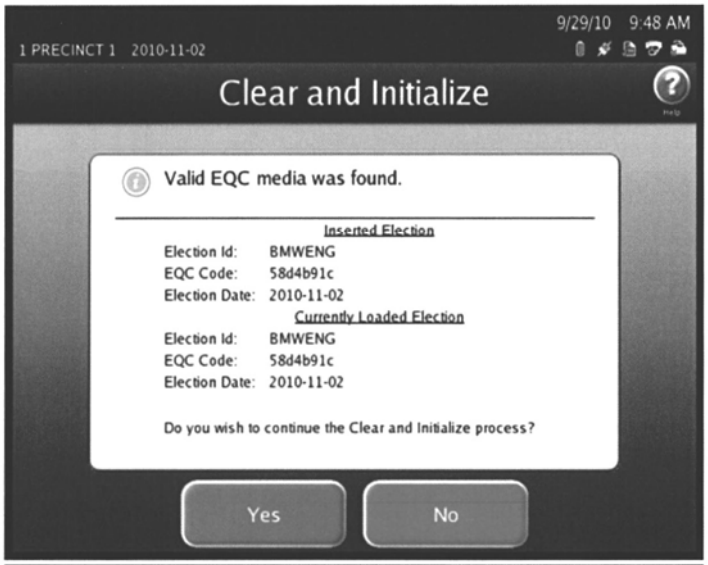
1. Press **Election** to access the Election menu.
2. From the Election menu, press **Setup** to access the Setup screen.
3. On the Setup screen, press **Clear and Initialize**. This displays the *Searching for EQC Media Device* pop-up screen.
4. Insert a valid (for the election) EQC Media Device flash drive into one of the scanner's USB ports. The previous pop-up screen is temporarily replaced by a *Detecting inserted device* pop-up screen. Then, the Qualification Code screen appears.



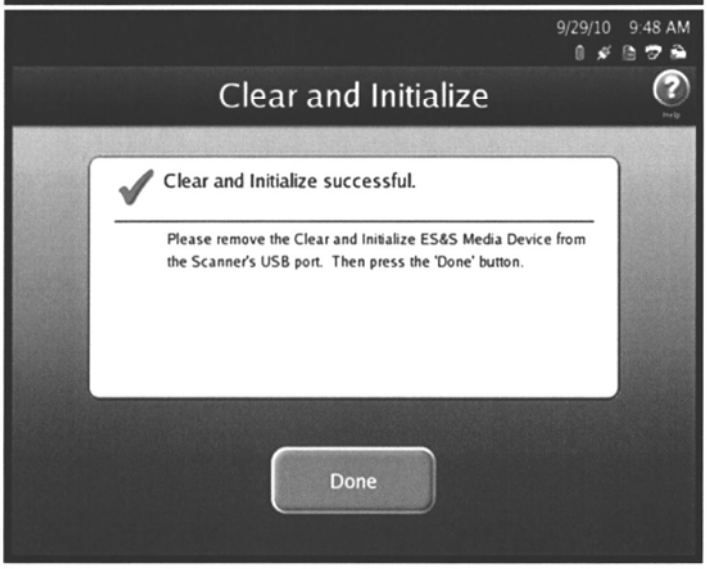
Reference: See Using USB Media Devices for instructions.

5. Enter the Qualification Code and then press **Accept**.

6. When the Clear and Initialize screen appears notifying you that the system has found valid EQC media for the election, press **Yes** to continue, or press **No** if you do not want to proceed. If you press **Yes**, a pop-up screen appears briefly to inform you that the DS850 is being cleared and initialized.



7. The following screen appears when the DS850 has been successfully cleared and initialized. Remove the EQC Media Device flash drive from the scanner's USB port and then press **Done**.



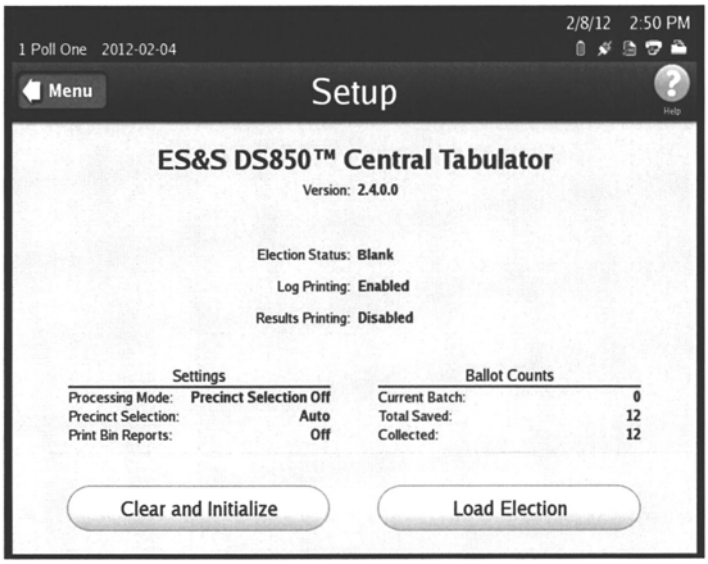
Loading the Election Definition

You must clear and initialize the DS850 prior to loading the election definition. The clear and initialize process clears all data from the machine and loads the necessary encryption keys to load and run the election.

Election coders create the USB flash drives containing the current election information for every new election. If ES&S is coding your election, they will send the drives to you.

Follow the steps below to load the election definition:

1. Press **Election** to access the Election menu.
2. From the Election menu, press **Setup** to access the Setup screen.

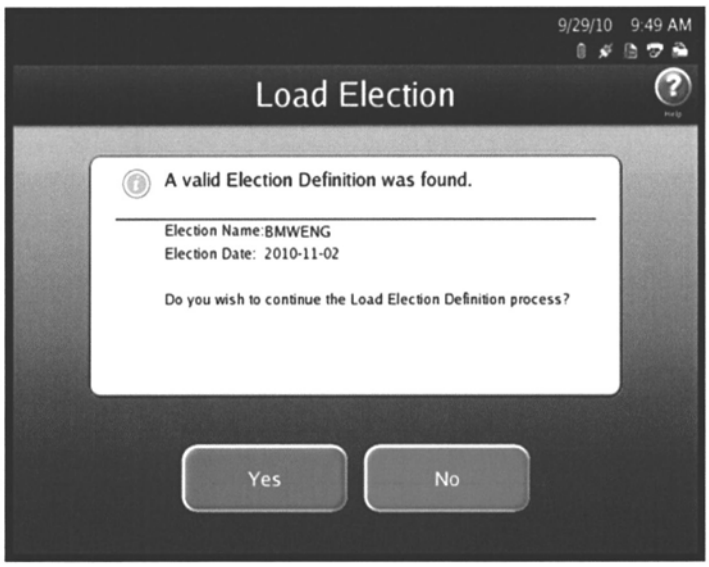


3. On the Setup screen, press **Load Election**. This displays the *Searching for Election Definition Media Device* pop-up screen.
4. Insert a valid (for the election) Election Definition Media Device flash drive into one of the scanner's USB ports. The previous pop-up screen is temporarily replaced by a *Detecting inserted device* pop-up screen. Then, the Election Code screen appears.

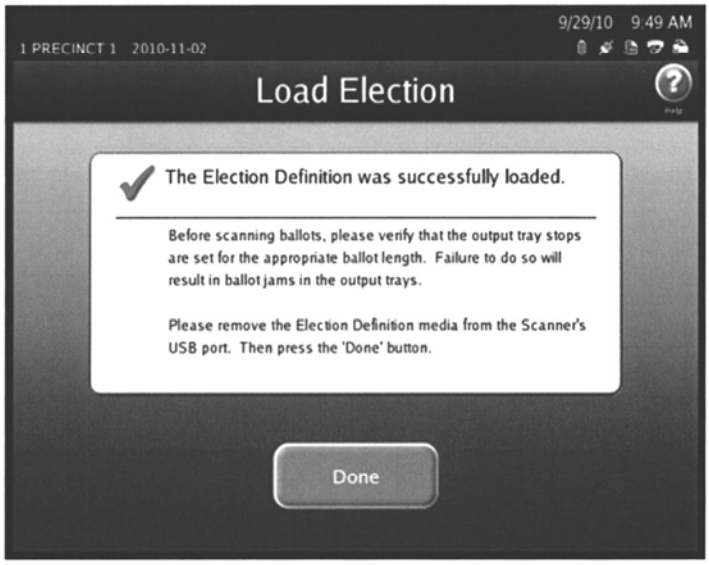
Reference: See Using USB Media Devices for instructions.

5. Enter the Election Code and then press **Accept**.

6. When the Load Election screen appears notifying you that the system has found valid Election Definition media for the election, press **Yes** to start the election definition load process, or press **No** to stop it. If you press **Yes**, a pop-up screen appears briefly to let you know that the election definition is being loaded.



7. The following screen appears when the election definition has been loaded successfully. Remove the Election Definition Media Device flash drive containing the election definition and store it in a safe place. Then press **Done**.



Setting the Date/Time

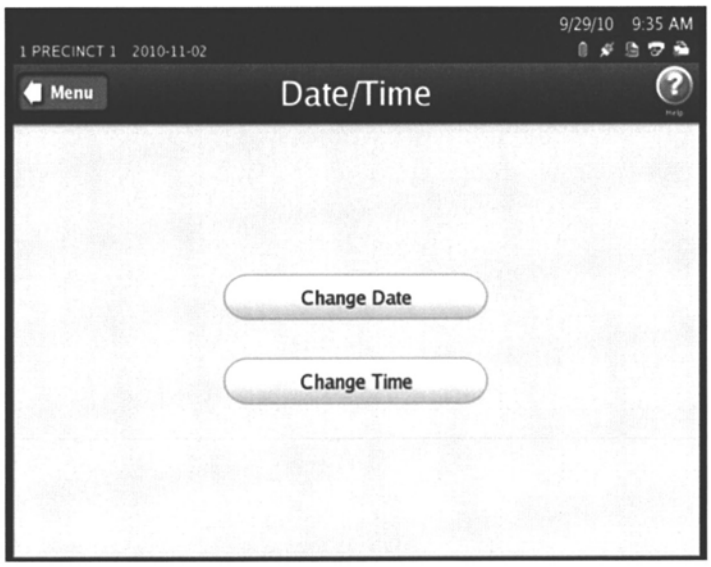
The Set Date/Time option allows you to change the date, time, or both on the DS850.

Note: The scanner's date and time settings cannot be changed when the scanner contains ballot data. Therefore, if the scanner's date and time are incorrect, change them before you begin scanning ballots.

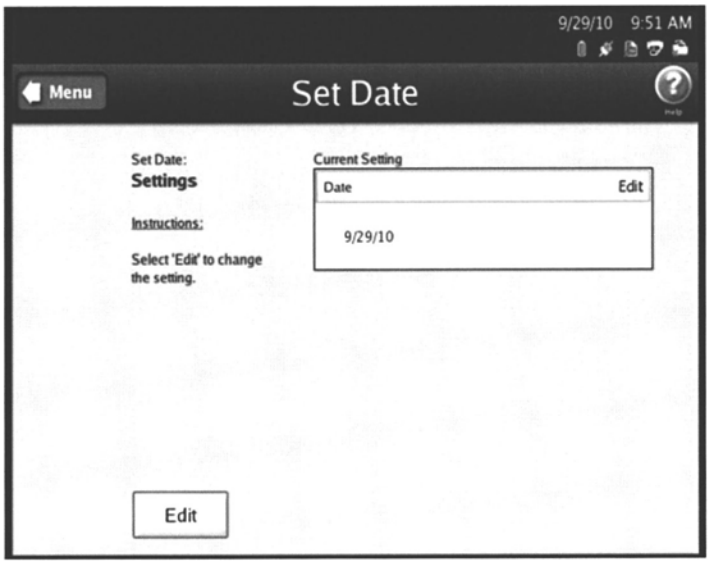
Follow the steps listed below to change the date on the DS850:

1. Press **Set Date/Time** on the System menu to access the Date/Time screen.

2. Press **Change Date** to change the date on the scanner. The Set Date settings screen appears displaying the current system date.



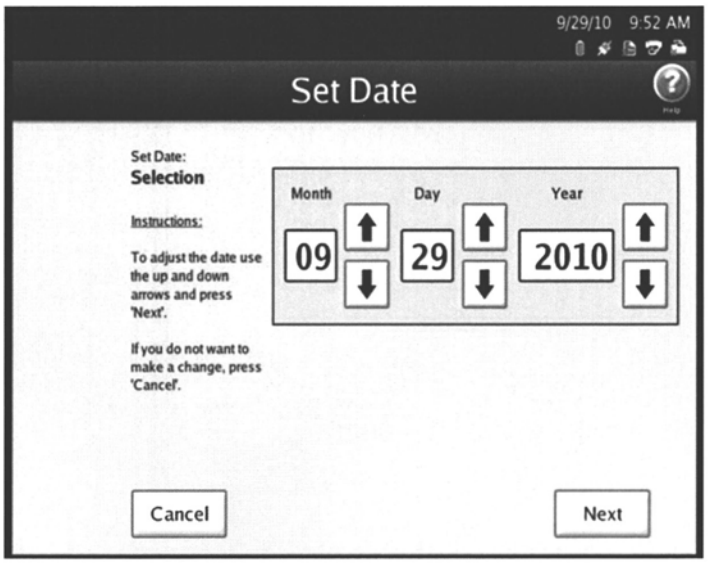
3. Press **Edit** on the Set Date settings screen to change the current system date.



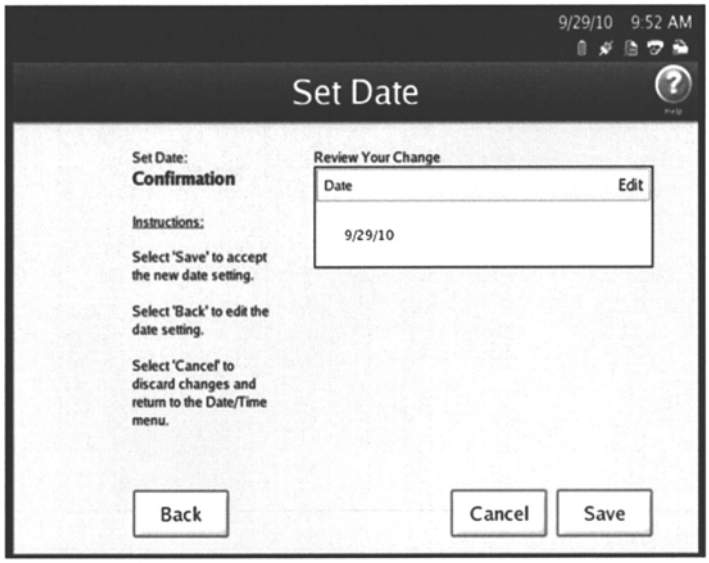
4. When prompted, enter the Administration Code and then press **Accept**.

5. When the Set Date selection screen appears, use the up and down arrows to modify the settings for month, day, and year.

6. After you have modified the system date settings, press **Next** to display the Set Date confirmation screen, or press **Cancel** to cancel the change.



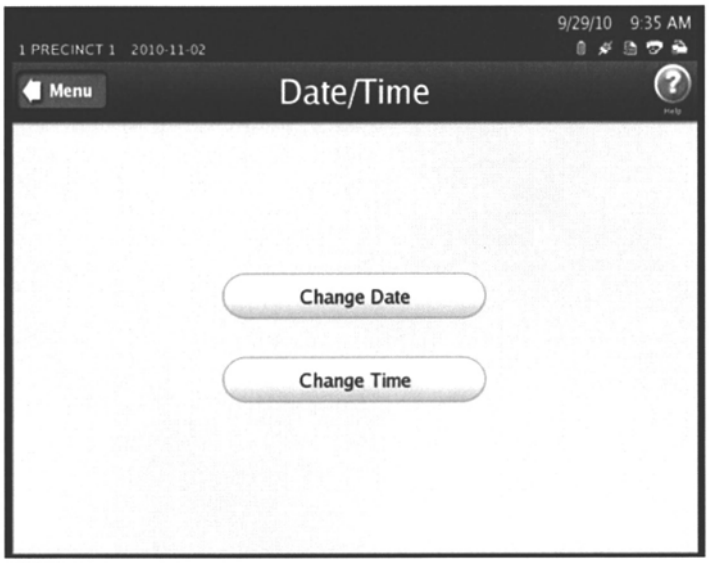
7. On the Set Date confirmation screen, review your changes. Then press **Save** to save the new settings, **Cancel** to cancel them, or **Back** to return to the previous screen.



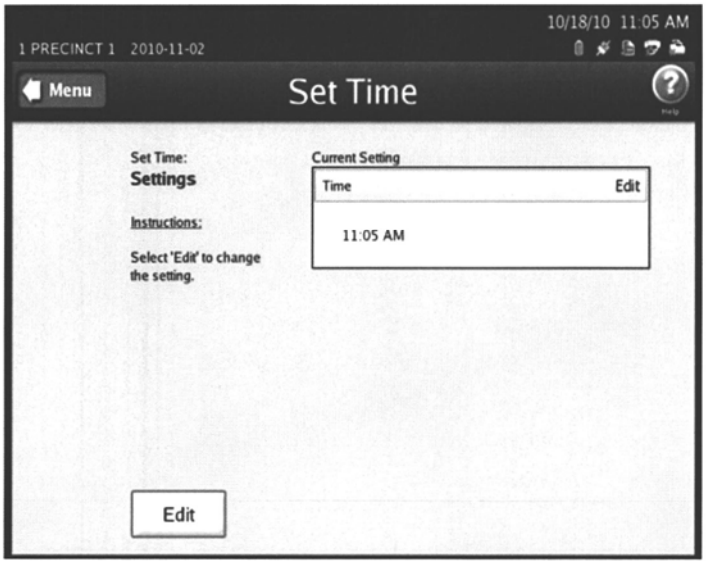
Follow the steps listed below to change the time on the DS850:

1. Press **Set Date/Time** on the System menu to access the Date/Time screen.

2. Press **Change Time** to change the time on the scanner. The Set Time settings screen appears displaying the current system time.

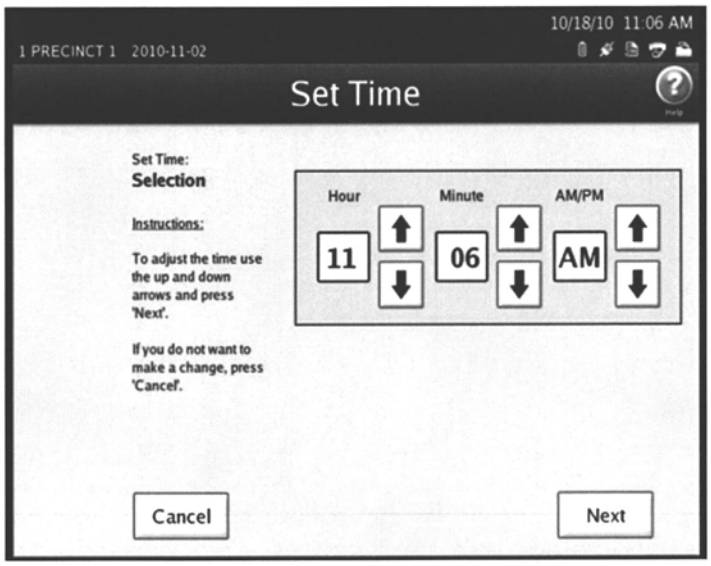


3. Press **Edit** on the Set Time settings screen to change the current system time.



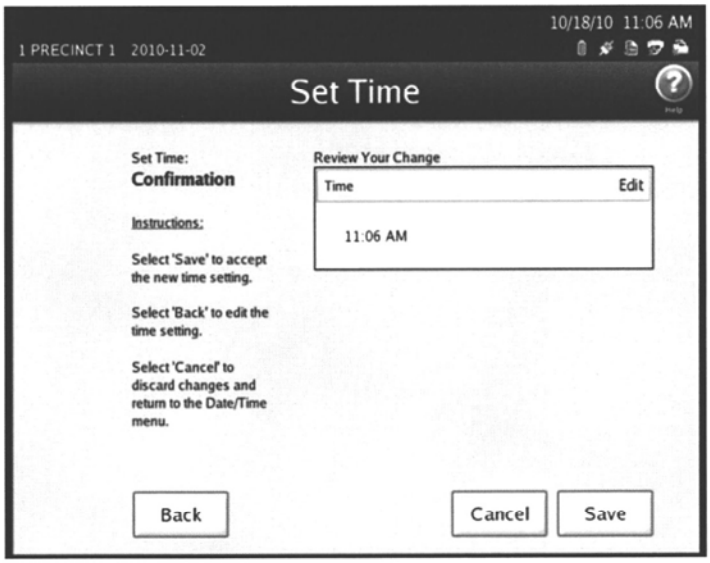
4. When prompted, enter the Administration Code and then press **Accept**.

5. When the Set Time selection screen appears, use the up and down arrows to modify the settings for hours and minutes and to change the indicator to AM or PM.



6. After you have modified the system time settings, press **Next** to display the Set Time confirmation screen, or press **Cancel** to cancel the change.

7. On the Set Time confirmation screen, review your changes. Then press **Save** to save the new settings, **Cancel** to cancel them, or **Back** to return to the previous screen.



Logic and Accuracy Testing

Perform logic and accuracy testing as required by your jurisdiction's procedures and applicable laws. Logic and accuracy testing includes zeroing totals, scanning the ballot test deck, and checking reports.

A hand counted test deck for each election is available from ES&S. A test deck is a stack of sample ballots that are marked and scanned at ES&S. The reports included with the test deck contain accurate results for the election definition sent to your jurisdiction.

Use the test deck to verify your election definition and to test scanner operation. Be sure to follow your local election laws regarding election testing.

The steps listed below are provided as a guide to help you develop a procedure for logic and accuracy testing that meets the requirements of your jurisdiction.

1. Clear and initialize the scanner; see Clearing and Initializing the Scanner.
2. Load the election definition; see Loading the Election Definition.
3. Print the Zero Report to verify that ballot totals are all zeros.
4. Scan the test deck of ballots; see Scanning.
5. Print the Results Report.
6. Compare your reports to the ones provided by ES&S to verify that the scanner is operating properly.
7. Clear the election results; see Clearing Election Results.
8. Print the Zero Report to verify that ballot totals are all zeros.

Note: If you turn off bin sorting for logic and accuracy testing, be sure to set the bin sorting options as required for your election after the testing has been completed. See Bin Sorting for information on turning off bin sorting.

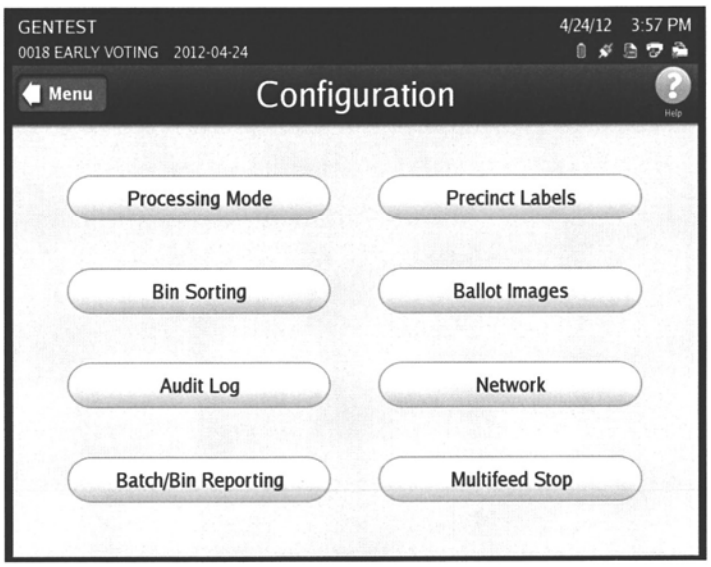
Reference: See Chapter 8: Reports for more information on the Zero and Results reports.

Configuring the Scanner

Use the Configuration screen to change the DS850's configuration settings from the default settings established in ElectionWare. This screen can be accessed by selecting **Configuration** from the Election menu screen. The following items are listed on the Configuration screen:

- Processing Mode
- Bin Sorting
- Audit Log
- Batch/Bin Reporting
- Precinct Labels
- Ballot Images
- Network
- Mulitfeed Stop

The following is an example of the Configuration screen.



Processing Mode

Reference: Default settings for the processing mode are part of the Election Definition defined in ElectionWare. See the *ES&S ElectionWare User Guides* for information on modifying Election Definition settings.

Note: If the election definition from ElectionWare specifies a By Style election, the processing mode can only be changed in ElectionWare and there are no available options on the Processing Mode screen.

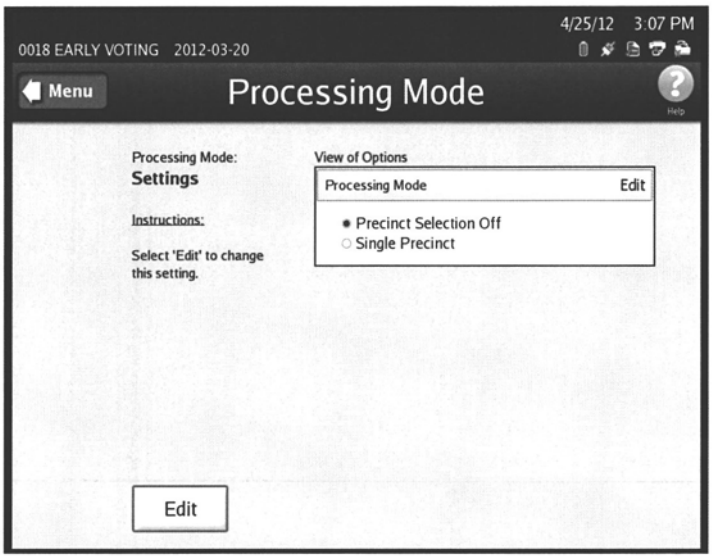
The two processing modes that can be used for an election are described below:

- **Precinct Selection Off**- Every ballot has the precinct information coded into the ballot ID.
- **Single Precinct** - Every ballot has the precinct information coded into the ballot ID. The user is prompted to enter the precinct number prior to scanning ballots. After the user enters the precinct number, the scanner diverts any ballot that is outside of that precinct to the top (out-stacked), Not Processed bin.

Follow the steps below to change the Processing Mode:

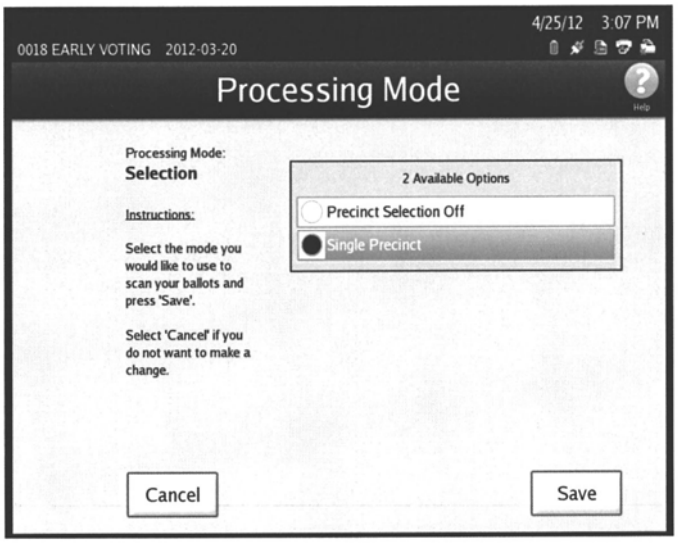
1. Press **Processing Mode** on the Configuration screen to access the Processing Mode settings screen.

2. Press **Edit** on the Processing Mode settings screen.



3. When prompted, enter the Election Code and then press **Accept**.

4. When the Processing Mode selection screen appears, highlight the desired Processing Mode by pressing on it. Then press **Save** to save the new Processing mode setting, or press **Cancel** to cancel the change.



Bin Sorting

There are two options on the Bin Sorting screen: Sort Settings and Sort Option.

Sort Settings

The Sort Settings option allows you to specify whether ballots with write-ins are to be processed and into which output bin they are to be diverted. It also allows you to specify whether undervotes, overvotes, crossovers, blank ballots, and ballots with unclear marks are to be processed.

Note: ElectionWare provides default settings for bin sorting in the Election Definition. The default setting for ballots with unclear marked ballots is to divert them to the Not processed bin (top bin). The default setting for ballots with write-ins is to process those ballots and divert them to the Processed with Write-ins bin (middle bin). The default settings for undervotes, overvotes, crossovers and blank ballots is to process them and divert them to the Processed bin (bottom bin).

If you want to use settings that are different from the ones in the Election Definition, you can use the bin sorting screens to change the settings on the scanner.

If the Sorting on/off feature is enabled, you can override the default settings for bin sorting in the Election Definition, as well as any changes that have been made using the Bin Sorting screens, by turning sorting off from the Scan Ballots screens. When the Sorting on/off feature is enabled, there is a button on the scan ballots screens that allows the user to turn sorting on or off.

Reference: See the *ES&S ElectionWare Volume IV: Deliver User's Guide* for additional information on ElectionWare.

See Sort Option for instructions on how to enable and disable the Sorting on/off feature.

See Sorting On/Off Feature for information on the impacts of turning sorting off.

The DS850 scanner diverts ballots to the following bins:

- **Processed bin (bottom bin)** - All ballots that do not meet any of the sort criteria are diverted to this bin. If the Ballots with Write-ins field on the Bin Sorting screen is set to Process, ballots with write-ins that meet no other sort criteria are also diverted to this bin.
- **Processed with Write-ins bin (middle bin)** - If the Ballots with Write-ins field on the Bin Sorting screen is set to Process & Sort, ballots with write-ins that meet no other sort criteria are diverted to this bin. No other ballot types are diverted to this bin.
- **Not Processed bin (top (out-stacked) bin)** - Any ballot that produces an unreadable image is automatically out-stacked to this bin. If the Ballots with Write-ins field on the Bin Sorting screen is set to Do Not Process, ballots with write-ins are diverted to the top bin. The Bin Sorting screen also allows you to choose any of the following ballot types to be out-stacked to this bin:
  - **Overvotes** - This option out-stacks ballots having more than the allowed number of votes cast for one or more contests.
  - **Undervotes** - The election definition can designate one or more contests as an "undervote-contest". This option out-stacks any scanned ballot that has a designated undervote contest that was undervoted. This option does not out-stack blank ballots.
  - **Crossovers** - In an Open Primary, this option out-stacks ballots with votes for any multiple party candidate.
  - **Blank Ballots** - This option out-stacks ballots that do not contain any votes, have been marked with a non-standard marking device for the DS850, or have been marked improperly (for example, the voter circled the candidate's name instead of filling in the appropriate oval).
  - **Counterfeit Ballots** - This option is currently unavailable.
  - **Unclear Marks** - This option out-stacks ballots with unclear marks.

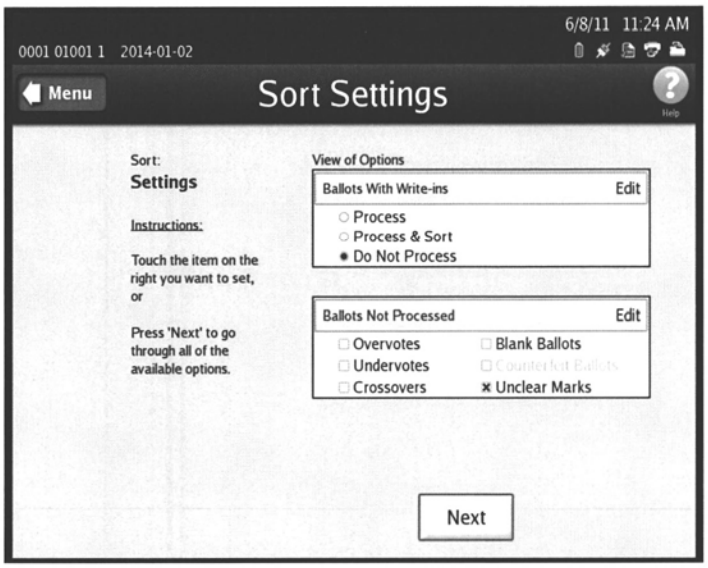
When the DS850 scans a ballot, it gathers two images (front and back) and a cast vote record from the ballot. A ballot is normally scanned within a batch of ballots. The cast vote records of ballots diverted to the Processed bin (bottom bin) and the Ballots with Write-ins bin (middle bin) are marked for inclusion in the collection process. The cast vote records of ballots diverted to the Not Processed bin (top (out-stacked) bin) are marked for exclusion from the collection process. These ballot images and cast vote records are then saved to the scanner's internal memory when the batch is saved.

Reference: See Exporting Data for information on exporting the vote results and ballot images to USB flash drives.

Follow the steps below to configure the sort settings:

1. Press **Bin Sorting** on the Configuration screen. The Bin Sorting options screen opens.
2. On the Bin Sorting options screen, press **Sort Settings**. The Bin Sorting settings screen is displayed.

3. On the Bin Sorting settings screen, press **Edit** in the **Ballots with Write-ins** header to modify the current setting.

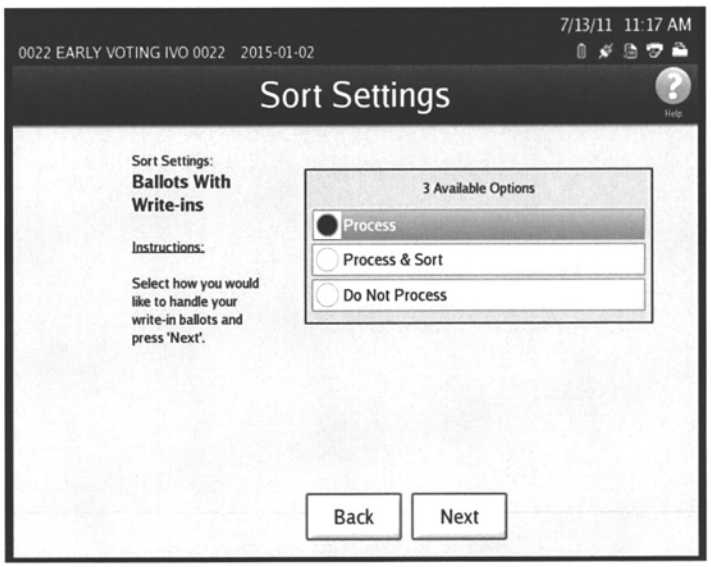


Note: If you want to modify only the Ballots With Write-ins setting or both the Ballots With Write-ins and Ballots Not Processed settings, press **Edit** in the **Ballots With Write-ins** header. After you modify the setting for the Ballots With Write-ins option, the Ballots With Write-Ins screen will be displayed.

If you want to modify only the Ballots Not Processed setting, press **Edit** in the **Ballots Not Processed** header. You will be prompted to enter the Election Code and then the Ballots Not Processed screen will be displayed.

4. When prompted, enter the Election Code and then press **Accept**.

5. When the Bin Sorting screen for Ballots With Write-ins appears, highlight the desired option for **Ballots With Write-ins** by pressing on it. Then press **Next** to proceed, or press **Back** to return to the previous page.

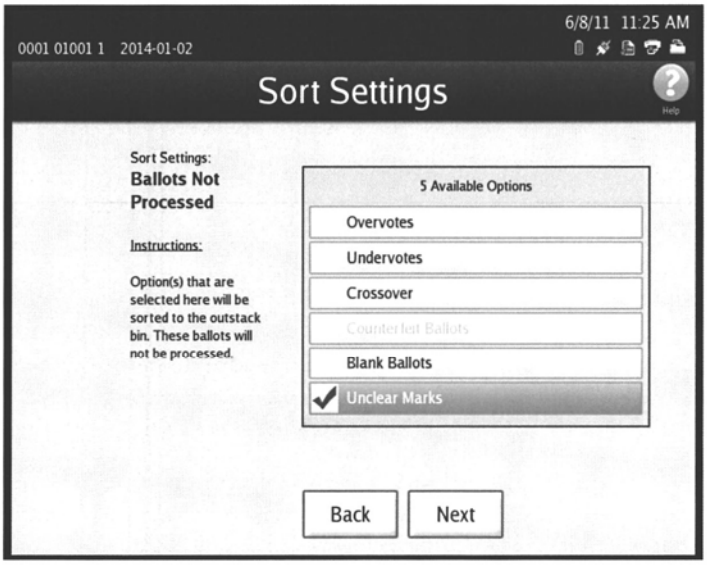


The output bin to which ballots with write-ins are diverted depends on which one of the following options is selected:

- **Process** - If the Process option is selected, the scanner diverts the write-in ballots that do not meet any other sort criteria to the Processed bin (bottom bin). The scanner gathers images and a cast vote record from each of these ballots. These records are then ready for the later collection and export of the vote results to a USB flash drive.
- **Process & Sort** - If the Process & Sort option is selected, the scanner diverts the write-in ballots that do not meet any other sort criteria to the Processed with Write-ins bin (middle bin). The scanner gathers images and a cast vote record from each of these ballots. These records are then ready for the later collection and export of the vote results, for all non-write-in contests. The separation of these ballots to the middle bin makes it easier for a Resolution Board to later review, validate, and capture the write-in candidate names from the scanned ballot images or the paper ballots themselves.

- **Do Not Process** - If the Do Not Process option is selected, the scanner diverts the write-in ballots to the Not Processed bin (top (out-stacked) bin). The scanner gathers images and a cast vote record from each of these ballots; however, these records are not included in the later collection and export of the vote results when using the Export for Results function.

6. When the Bin Sorting screen for Ballots Not Processed appears, highlight each ballot type that you do not want the scanner to process, by pressing on it. (When you highlight a ballot type, a check mark displays in the check box to the left of the ballot type.) The scanner will sort the selected ballot types to the Not Processed bin. When you are done, press **Next** to review your settings, or press **Back** to return to the previous screen.



Note: The counterfeit ballot sorting option is currently unavailable.

7. When the Bin Sorting confirmation screen appears, review the new bin sorting settings. Then press **Save** to save the new settings, press **Back** to return to a previous screen, or press **Cancel** to cancel the changes.

Note: For Logic and Accuracy Testing, you may be required to turn off bin sorting prior to scanning the test deck. Bin sorting is turned off when the **Ballots With Write-ins** option is set to Process and none of the ballot types for the **Ballots Not Processed** option are selected. When logic and accuracy testing has been completed, make certain the bin sorting options are set as required for your election.

Sort Option

The Sort Option allows you to enable or disable the Sorting on/off feature. When the Sorting on/off feature is enabled, the Sorting on/off button is displayed in the top portion of the main scan ballots screen with Sorting On. When the Sorting on/off feature is disabled, the Sorting on/off button is not displayed on the main scan ballots screen, however Sorting remains on. By default, the Sort Option is disabled.

Reference: See Sorting On/Off Feature for information on the impacts of turning sorting off.

Follow the steps below to modify the Sort Option setting:

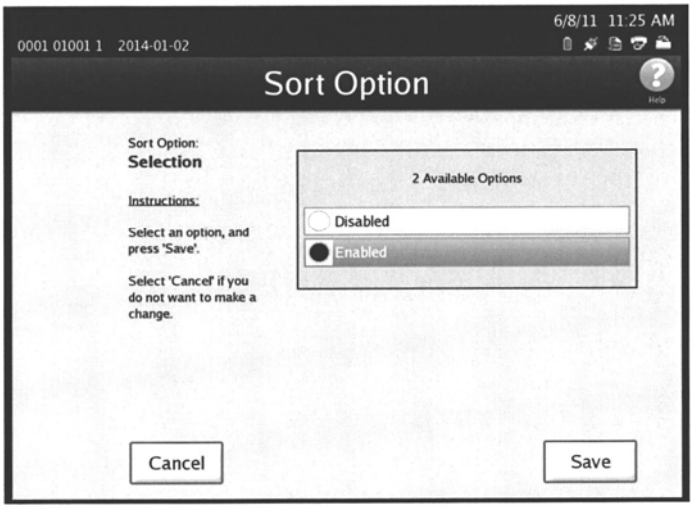
1. Press **Bin Sorting** on the Configuration screen. The Bin Sorting options screen opens.

2. On the Bin Sorting options screen, press **Sort Option**. The Sort Option settings screen is displayed.

3. On the Sort Option settings screen, press **Edit**.

4. When prompted, enter the Administration code and then press **Accept**. The Sort Option selection screen is displayed.

5. On the Sort Option selection screen, highlight the desired option (Disabled or Enabled) by pressing on it. Then press **Save** to save the new setting, or press **Cancel** to cancel the change.



Audit Log

Activity on the DS850 is recorded to the audit log, and the DS850 prints the contents of the audit log to the attached dot matrix printer.

ElectionWare provides the settings for the audit log printing function in the election definition. There are settings that are provided which enable audit log printing and prevent the user from disabling it. The user also has the option to set the ability to enable or disable the Real Time Audit Log on the DS850.

Reference: See the *ES&S ElectionWare Volume IV: Deliver User's Guide* for additional information on ElectionWare.

Batch/Bin Reporting

The Batch/Bin Reporting screen allows you to change the number of copies of each Batch/Bin report to be automatically printed whenever a user saves a scanned batch of ballots. Together, the following three Batch/Bin reports identify the resulting bin disposition of each ballot within the saved batch:

- Not Processed
- Processed with Write-ins
- Processed

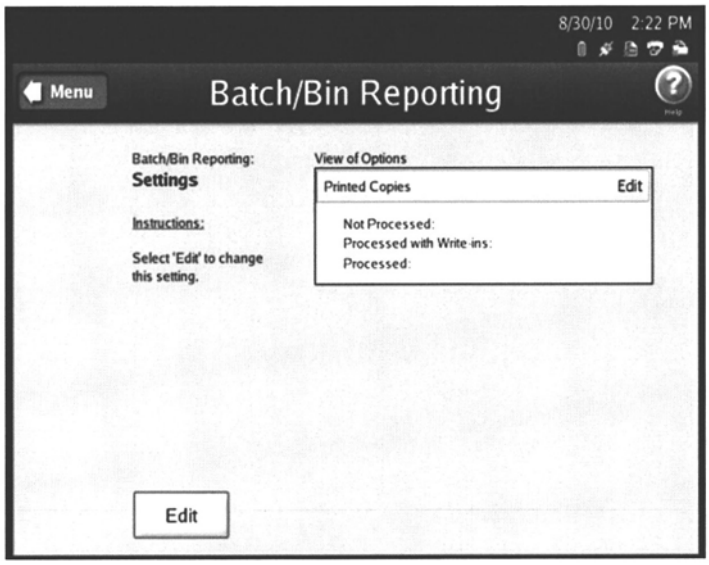
Note: ElectionWare provides the default settings for batch/bin reporting in the election definition. By default, no batch/bin reports are printed automatically when the user saves a scanned batch of ballots. If you want reports to print automatically when you save a batch of scanned ballots, you must use the Batch/Bin Reporting screen to specify the number of reports you want printed.

Reference: See the *ES&S ElectionWare Volume IV: Deliver User's Guide* for additional information on ElectionWare.

Reference: The Batch/Bin reports can also be printed from the Reports menu. See Chapter 8: Reports for instructions on how to preview and print the reports and for an example of a Batch/Bin Report.

Follow the steps below to change the number of copies to be automatically printed for each report:

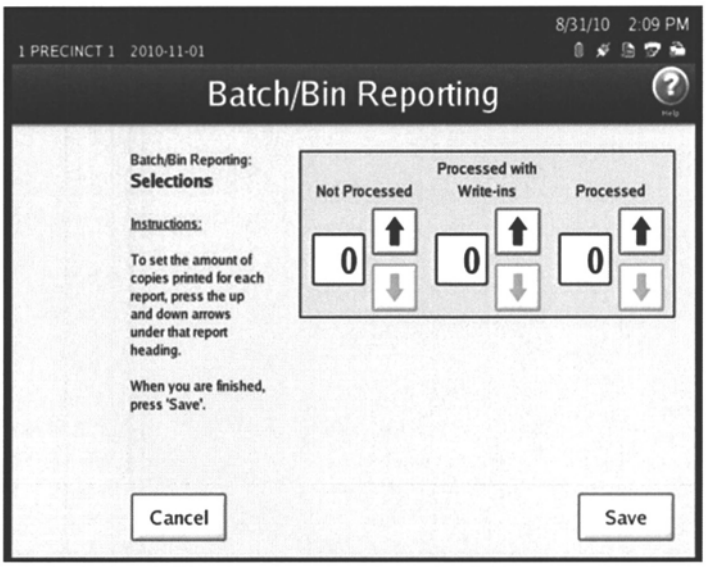
1. Press **Batch/Bin Reporting** on the Configuration screen to access the Batch/Bin Reporting settings screen.
2. When the Batch/Bin Reporting settings screen appears, press **Edit** to modify the current settings.



3. When prompted, enter the Election Code and then press **Accept**.

4. When the Batch/Bin Reporting selections screen appears, use the up and down arrows to change the number of copies to be printed for each report type: Not Processed, Processed with Write-ins, and Processed.

5. When you are finished, press **Save** to save the changes, or press **Cancel** to cancel the changes.



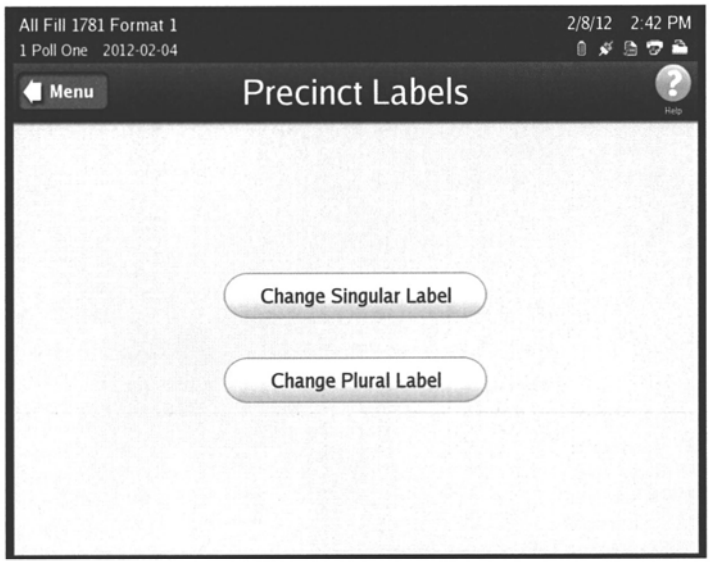
Precinct Labels

The Precinct Labels section will allow you to change the name of how a precinct is labeled on the scanner. You will be able to change the name to your jurisdictions preference (example: borough, ward, etc...). For example, if you change the name to borough, it will replace “precinct” on the screens and reports.

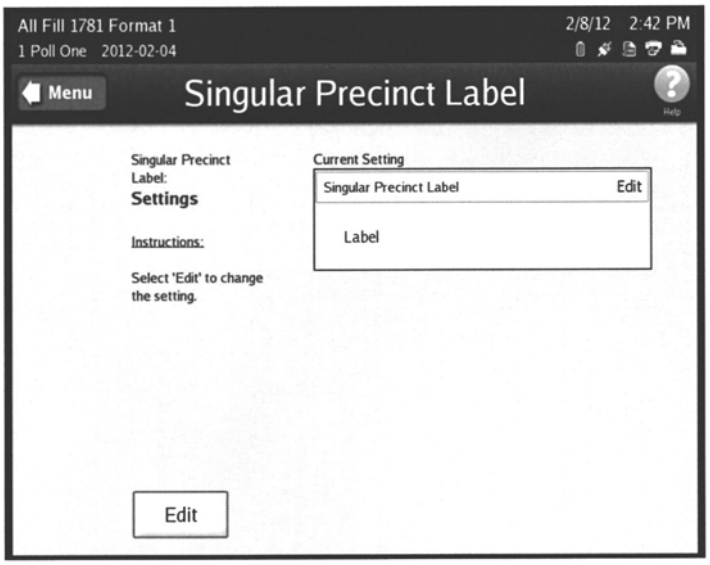
1. Select **Precinct Label** on the Configuration screen to access the Precinct Labels settings screen.
2. When the Precinct Labels screen comes up, you will have the following choices:
   - Change Singular Label - this will change any of the labels that are singular text.
   - Change Plural Label - this will change any of the labels that are plural.

Singular Label

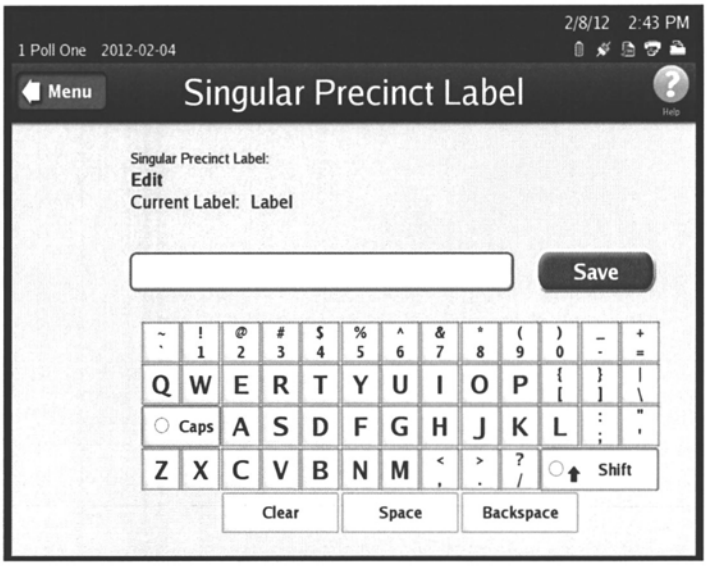
3. Press **Change Singular Label** to change the singular text.



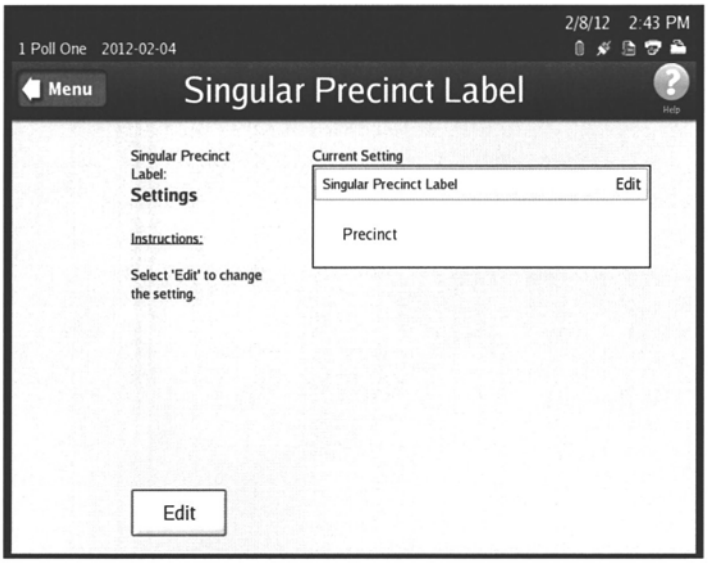
4. Press **Edit** to change the text of the label.



5. Enter the preferred name into the field by using the on-screen keyboard. After you have completed entering the name press **Save**.

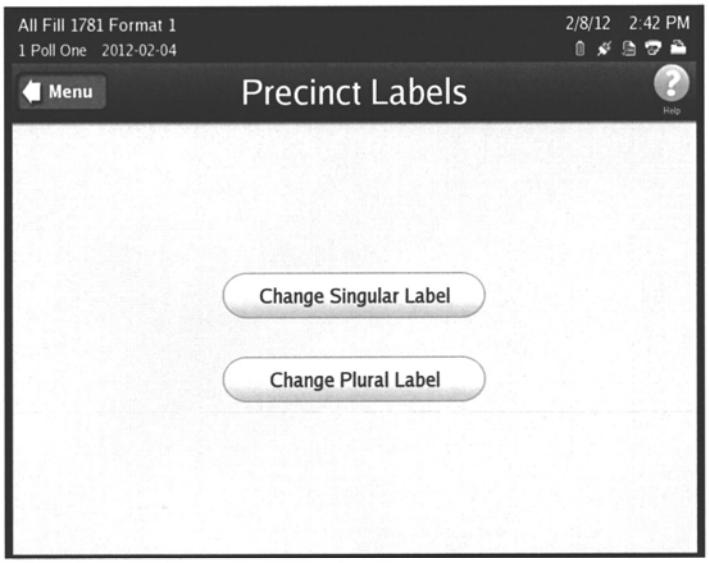


6. Confirm that the name is correct, if it is correct select the Menu button. This will return you to the Precinct Labels screen.

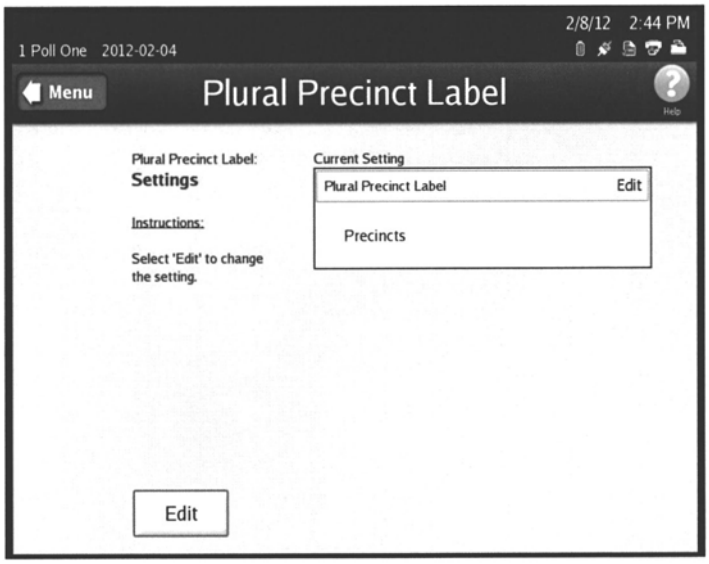


Change Plural Label

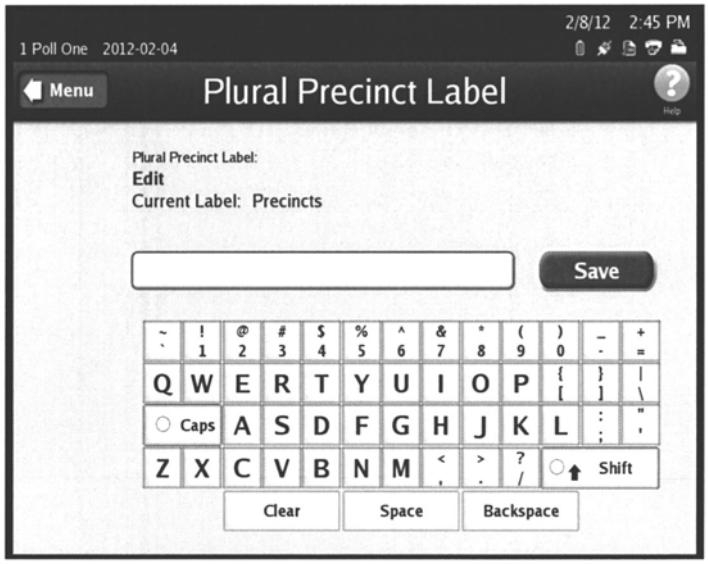
1. Press **Change Singular Label** to change the singular text.



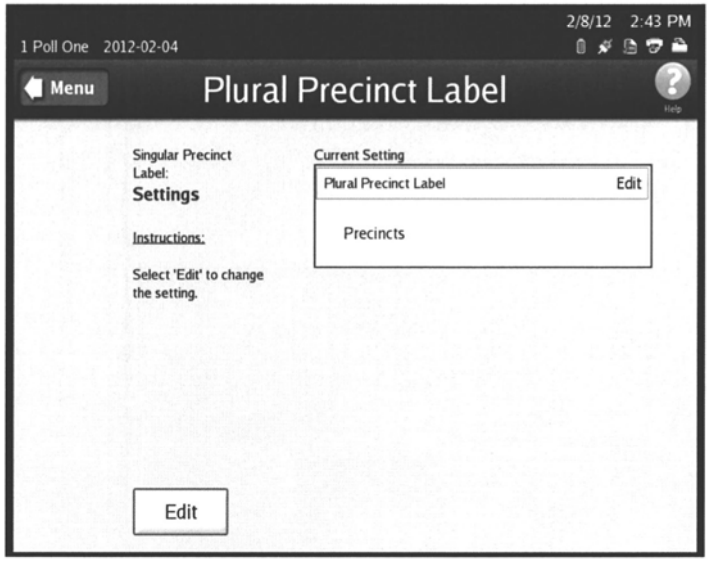
2. Press **Edit** to change the text of the label.



3. Enter the preferred name into the field by using the on-screen keyboard. After you have completed entering the name press **Save**.

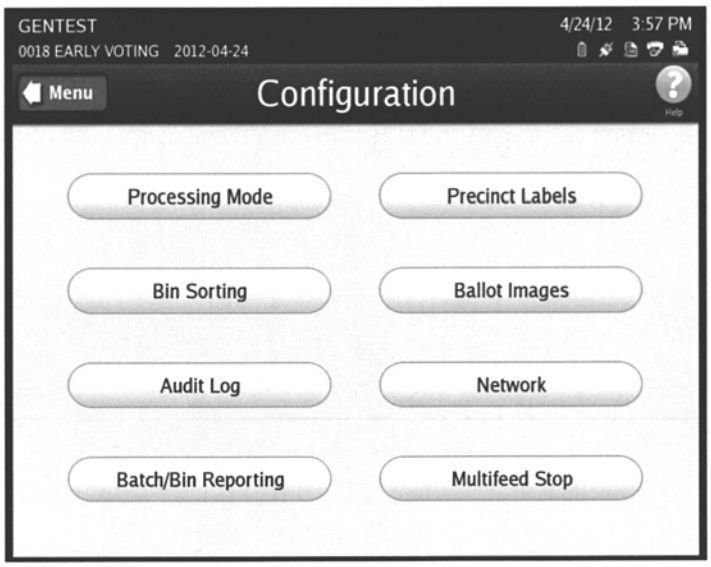


4. Confirm that the name is correct, if it is correct select the Menu button. This will return you to the Precinct Labels screen.

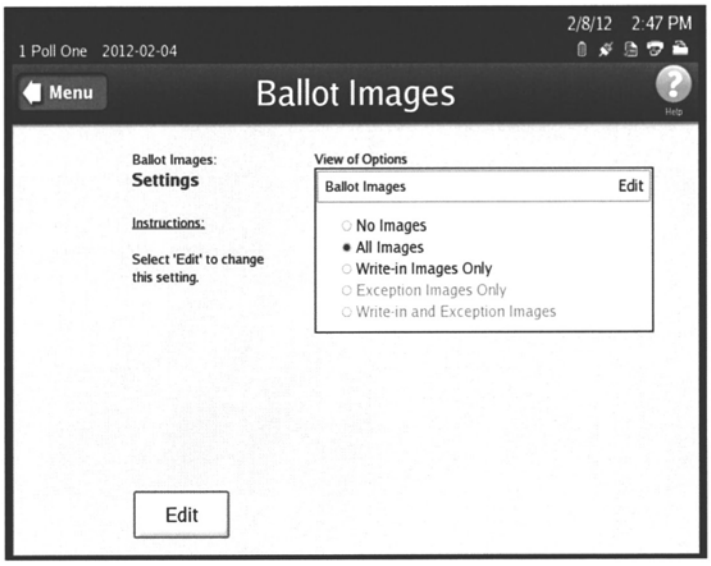


Ballot Images

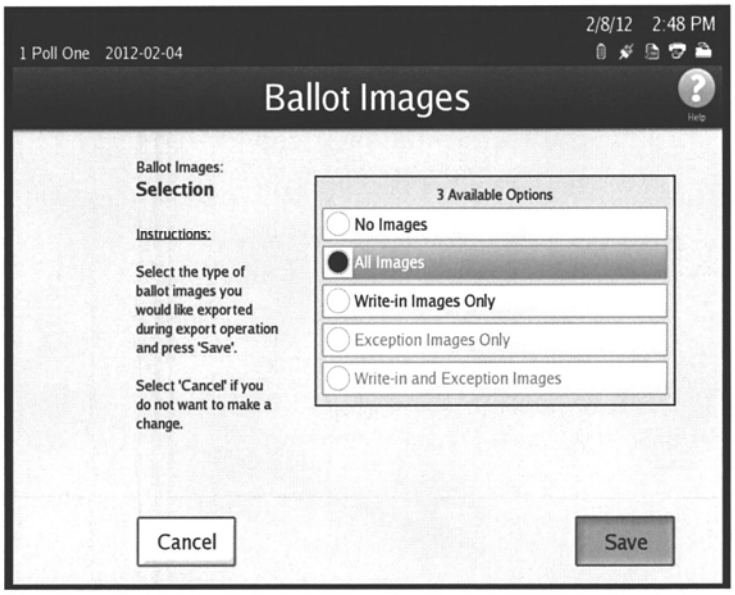
1. Select **Ballot Images** on the Configuration screen to access the Ballot Images settings screen.
2. Press **Edit** to update the selections.



3. You will be able to select from one of the following options:
   - No Images
   - All Images
   - Write-In Images Only
   - Exception Images Only *(Not available in this version.)*
   - Write-In and Exception Images *(Not available in this version.)*



4. After you make your selection, press **Save** to save your selection, or press **Cancel** to exit.

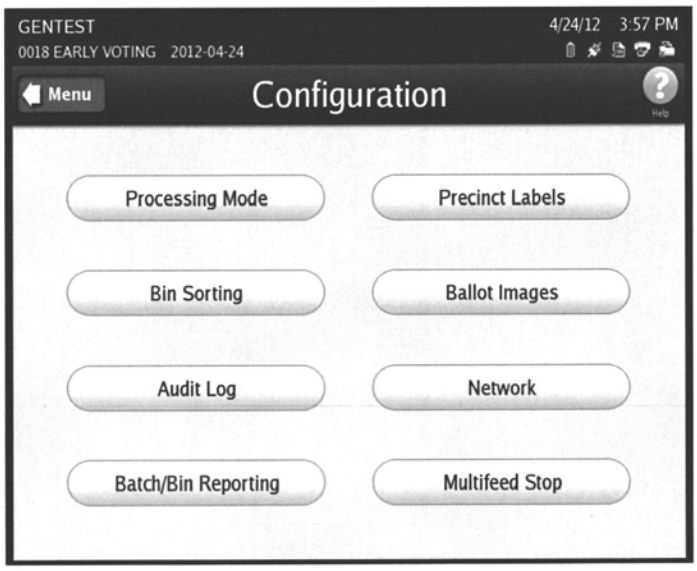


Network

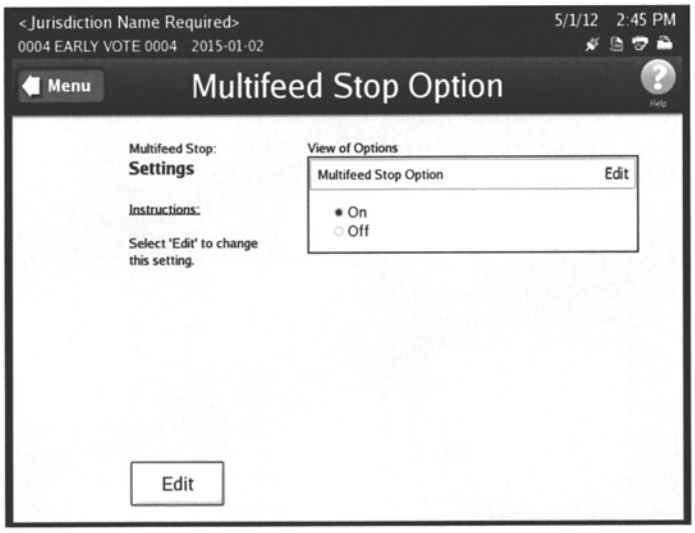
Note: See Chapter 9: DS850 Network on instructions for using a network.

Mulitfeed Stop

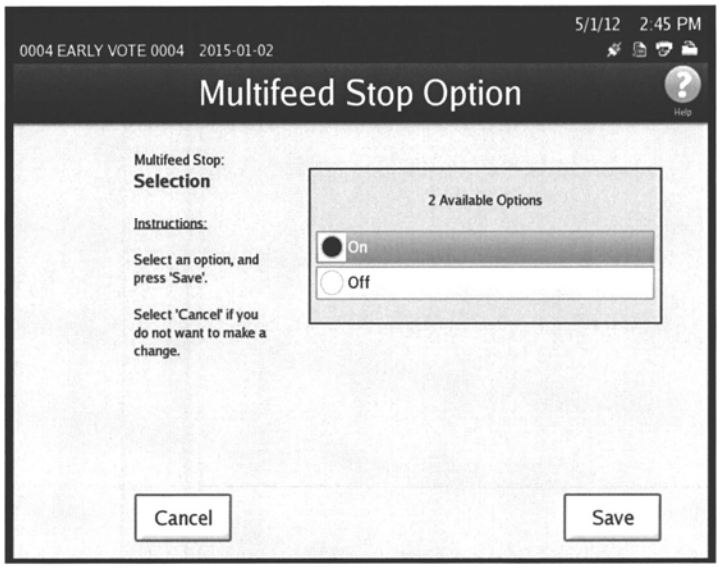
1. Select **Multifeed Stop** on the Configuration screen to access the Ballot Images settings screen.



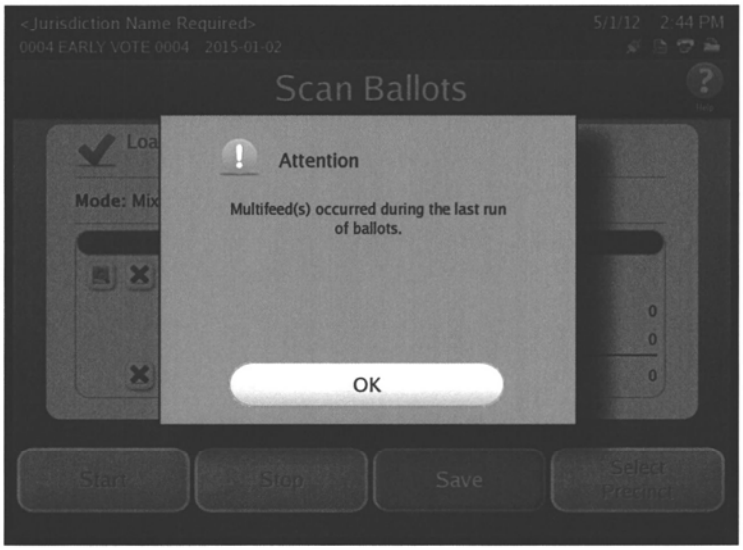
2. Press **Edit** to select you option to turn on or off the multifeed detection.



3. Press **On** or **Off** to select the option you would like. To save the selection press **Save**.



This is an example of the error screen you will see if you have the Multifeed Stop Option on. You will get this error when multiple ballots are fed through the scanner at the same time.



Chapter 6: Election Day Tasks

This chapter contains instructions for the following Election Day tasks:

- Scanning
- Printing Election Reports
- Exporting Data
- Clearing Election Results

Reference: Before you begin the Election Day tasks, see Chapter 5: Pre-Election Day Tasks to make certain that all pre-election tasks have been completed.

Special Instructions for Processing Folded Ballots

This section covers instructions on how to process folded ballots.

1. Remove the ballot from the envelope and unfold it.

2. Back fold the crease on each fold in the ballot.

3. Start running ballots by laying them flat in small stacks of about 25 to 50 ballot. Slowly increase the stack size if the scanner successfully processes smaller ballot batches without issues. Maximum stack size for folded ballots should not exceed 150 ballots.

Scanning

This section covers the following:

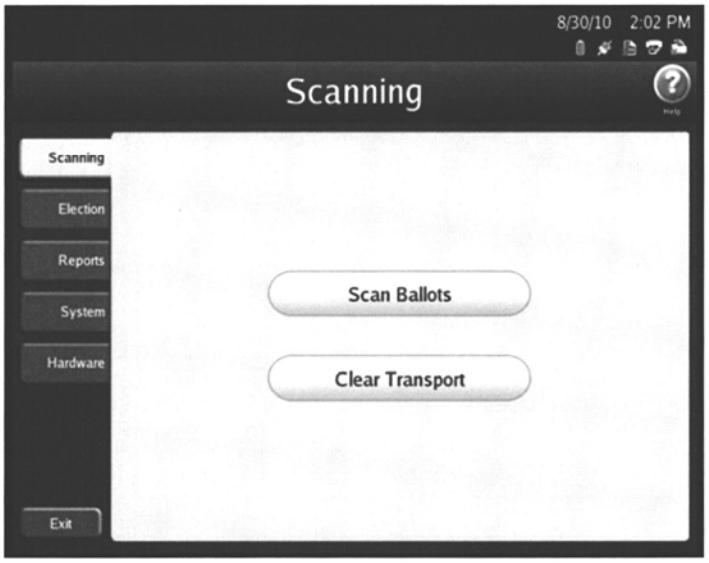
- Scanning ballots
- Handling out-stacked ballots
- Saving a batch of ballots
- Deleting a batch of ballots
- Using the Sorting on/off feature

Scanning the Ballots

Warning: The ballot scanning process assumes that the scanner has been powered on, all pre-Election Day tasks have been completed, the election definition has been loaded, the user has the authority to scan ballots, and the scanner has been calibrated.

Note: Before you attempt to scan ballots, make sure that the camera lid and rear panel are closed. The scanner does not allow functions that engage the motors to be performed when the camera lid or rear panel is open.

1. On the touch screen, press **Scanning** to display the Scanning menu.



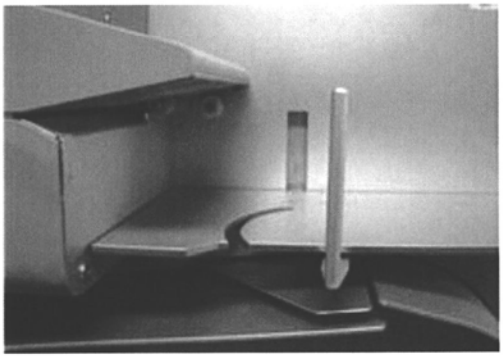
2. Press **Scan Ballots** from the Scanning menu. The *Load Ballots* screen appears. As shown below, in Mixed Precinct mode all of the buttons in the bottom portion of the screen are dimmed. However, in By Style and Single Precinct modes, the Select Precinct button would be available.

3. Load the ballots as described below.

   a. Adjust the length of the input and output trays to accommodate the ballots.

Reference: See Adjusting the Input and Output Trays for instructions on how to adjust the trays.

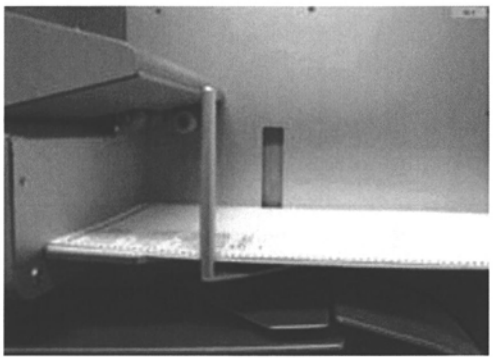
   b. Slide the ballot guide out of the curved opening in the input tray, as shown in the picture on the right.



c. Place the ballots in the input tray. The ballots can be in any orientation.

Note: ES&S recommends using a jogger to separate the ballots and to align the ballot stack before you place the ballots in the input hopper. If the ballot stack is slightly curved, place the stack in the input hopper with the convex side up. If the scanner cannot read a ballot because of its condition or because of the way in which it is fed into the scanner, the scanner will not process the ballot and will out stack the ballot to the Not Processed (top) bin.

d. Slide the ballot guide back toward the opening until it rests gently against the ballot stack as shown in the picture on the right.



5. Once the ballots have been loaded, the *Scan Ballots* screen appears. Press **Start** to begin scanning.

Note: If you are required to select a precinct and have not yet done so, the **Start** button will be dimmed. The only button that you will be able to use is the **Select Precinct** button. Press **Select Precinct** and follow the steps listed in the Select a Precinct section to search for and select a precinct. After you have selected a precinct, you will be able to scan ballots.

While the ballots are being scanned, the *Scanning* screen is displayed. Only the **Stop** button is available on this screen; the other buttons are dimmed.

Note: If you need to stop the machine before the input tray is empty, press **Stop** to stop scanning. The number of ballots that have been scanned will be displayed in the Current column.

After the ballots have been scanned, the *Scan Ballots* screen is re-displayed. This time, only the **Save** button is available; the other buttons are dimmed. The Current column on the screen indicates the number of ballots in each bin, as well as the total number of ballots scanned.

At this point, you can do any one of the following:

- Save the current batch; see Save the Current Batch.

Note: If ballots have been out-stacked to the top (not processed) bin, you have the option of generating the Not Processed Ballots report. You can also remove the ballots from the bin and reset the top bin quantity to zero, before you save the batch. The removed ballots can later be reviewed or re-scanned.

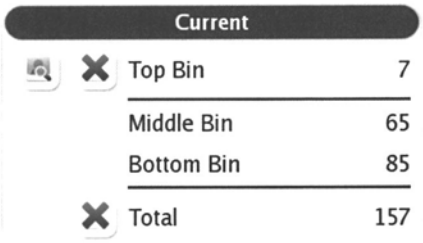
Reference: See Out-Stacked Ballots for additional information.

- Delete the current batch; see Delete the Current Batch.
- Load more ballots into the input tray. The *Scan Ballots* screen will be displayed. Press **Start** to scan the additional ballots. When the ballots have been scanned, the *Scan Ballots* screen will be displayed again, and the numbers in the Current column will be updated.

Warning: If any of the output hoppers are full or nearly full and you wish to scan more ballots into the batch, make sure that you keep any ballots you remove from the output bins segregated from other batches. Ballots removed but not yet saved as part of a batch must all be segregated by the bin from which the ballots were removed.

Out-Stacked Ballots

The following is an example of the Current column on the scan ballots screen, showing seven ballots out-stacked to the top (not processed) bin.

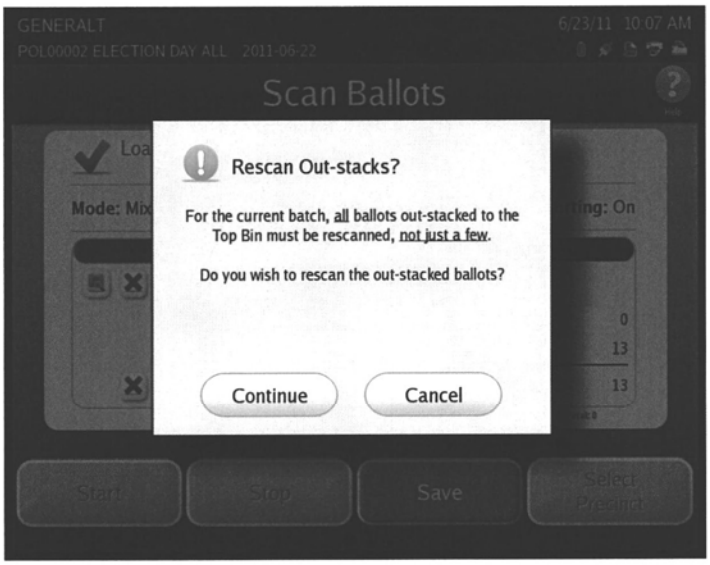


Note: The red "X" at the bottom of the column is used to delete the entire batch.

Reference: See Delete the Current Batch for instructions on deleting the current batch.

Press the button to the left of the top red "X" to generate and display the Not Processed Ballots report.

If you want to either review or re-scan the ballots out-stacked to the top bin, you can remove them and reset the count for the top bin to zero. To reset the count for the top bin, press the top red "X". You will be prompted to indicate whether you want to re-scan the ballots. If you select **Continue** the Top Bin count is zeroed out. If you select **Cancel** the Top Bin count remains unchanged.



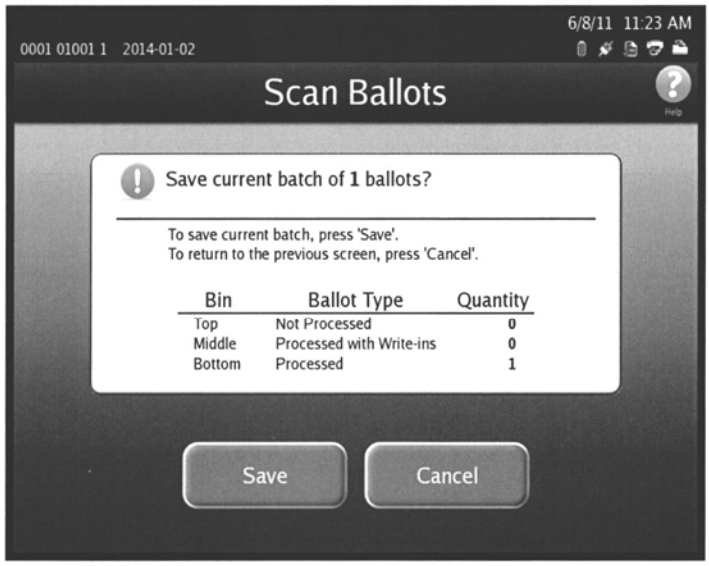
Note: Ballots that are outstacked for "Image Unreadable" or "Ballot Long" conditions and fail to read after a second scan should be reviewed and processed using the adjudication procedures established by your jurisdiction.

Save the Current Batch

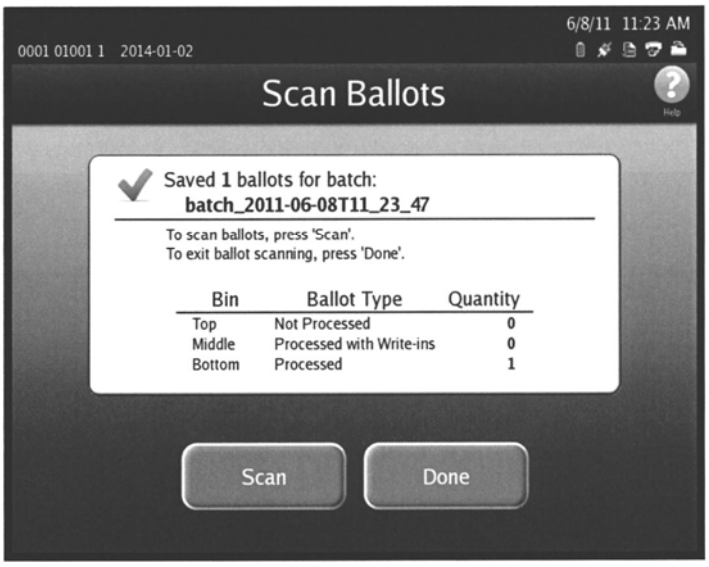
Follow the steps listed below to save a batch of scanned ballots:

1. From the *Scan Ballots* screen, press **Save**.

2. When you are prompted to confirm that you want to save the batch, press **Save**.



After you press **Save**, a popup screen containing the following message will display briefly: "The batch ballot data is being saved." After the data has been saved, the popup screen closes and a screen similar to the one shown below is displayed.



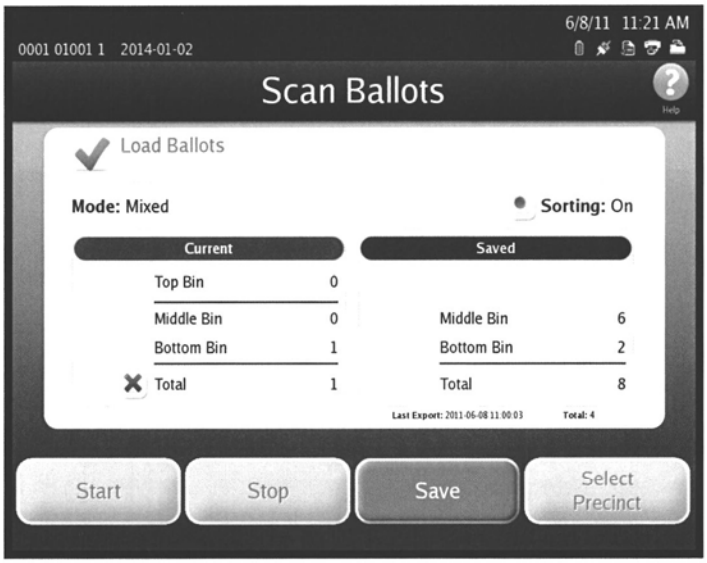
At this point, you can press **Done** or **Scan**. If you press **Done**, the Scanning menu is displayed. If you press **Scan**, the *Scan Ballots* screen is displayed, allowing you to scan another batch of ballots.

Note: If you press **Scan**, when the *Scan Ballots* screen opens, the quantities in the Current column will be all zeros, and the quantities in the Saved column will have been updated to include the quantities in the saved batch.

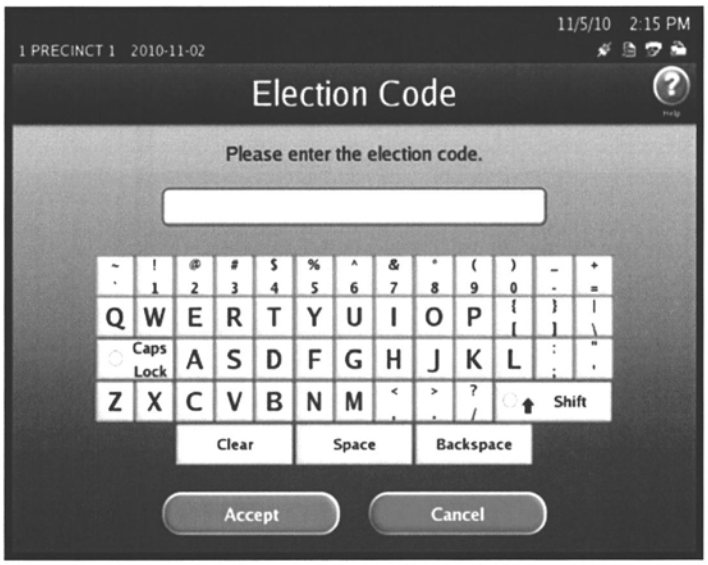
Delete the Current Batch

Follow the steps listed below to delete a batch of scanned ballots:

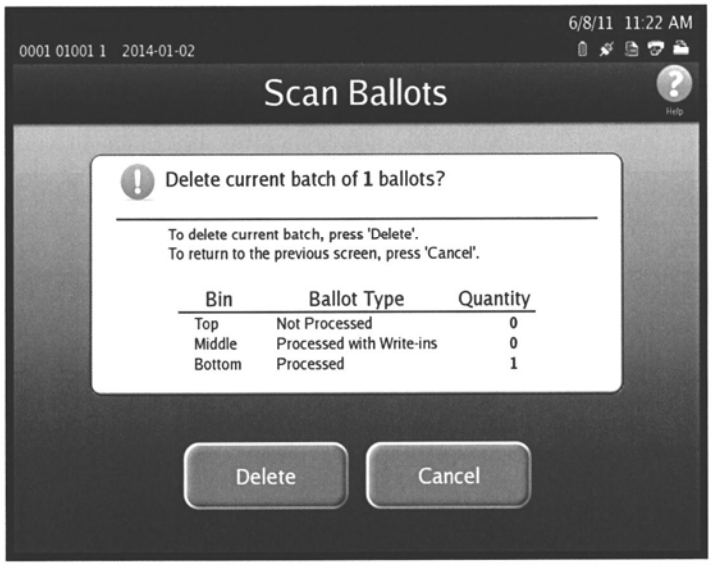
1. Click the red "X" to the left of the Total line in the Current column.



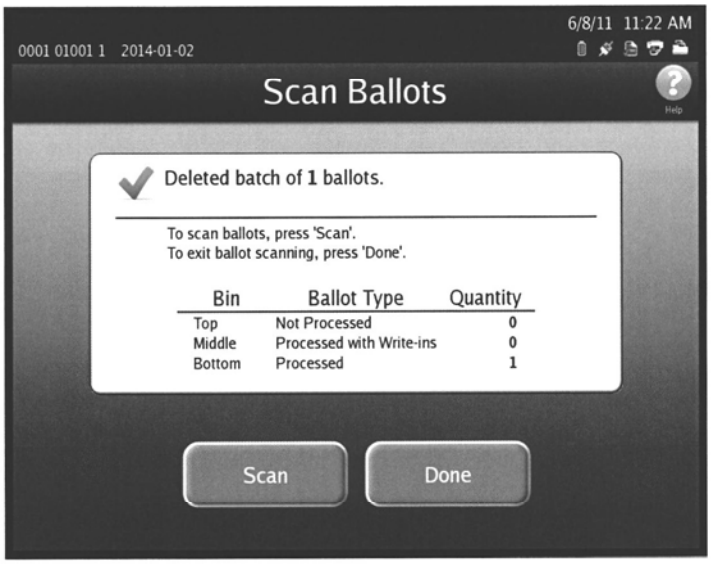
2. When prompted, enter the Election Code and then press **Accept**.



3. When you are prompted to confirm that you want to delete the batch, press **Delete**.



After you press **Delete**, a popup screen containing the following message will display briefly: "The batch ballot data is being deleted." After the data has been deleted, the popup window closes and a screen similar to the one shown below is displayed.



At this point, you can press **Done** or **Scan**. If you press **Done**, the Scanning menu is displayed. If you press **Scan**, the *Scan Ballots* screen is displayed.

Note: If you press **Scan**, when the *Scan Ballots* screen opens, the quantities in the Current column will have been reset to zeros.

Sorting On/Off Feature

By default, the Sorting on/off feature is disabled. You can, however, enable the feature by changing the Sort Option setting to enabled.

Reference: See Sort Option for instructions on how to enable and disable the Sorting on/off feature.

When the Sorting On/Off feature is initially enabled, the Sorting On/Off button is displayed with "Sorting On" in the top portion of the main scan ballots screen, as shown below.

When the Sorting button is "On", the current, existing sort settings are in effect.

Note: When loaded, the Election Definition establishes the sort settings for the election. An Operator may change these settings via the series of Sort Settings screens, previously described in this manual. Accordingly, the current, existing sort settings may not be those established by the Election Definition.)

If the Sorting button is set to Off, the following occur:

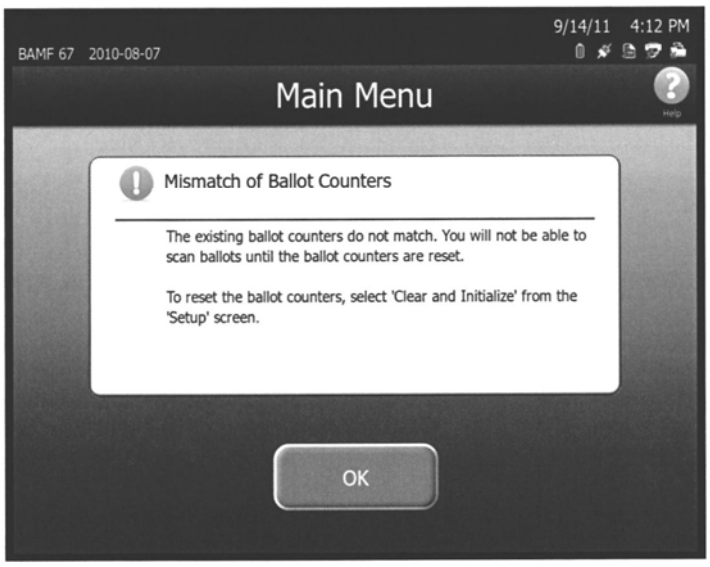
- Overvotes, blank ballots, undervotes, counterfeit ballots, crossovers, and ballots with unclear marks are processed (bottom bin).
- If Ballots with Write-ins has been set to Do Not Process then ballots with write-ins are processed and sorted (middle bin).
- If Ballots with Write-ins has been set to Process then ballots with write-ins are processed (bottom bin).
- If Ballots with Write-ins has been set to Process & Sort then ballots with write-ins are still processed and sorted (middle bin).

- Only “image unreadable” ballots are out-stacked to the top bin.

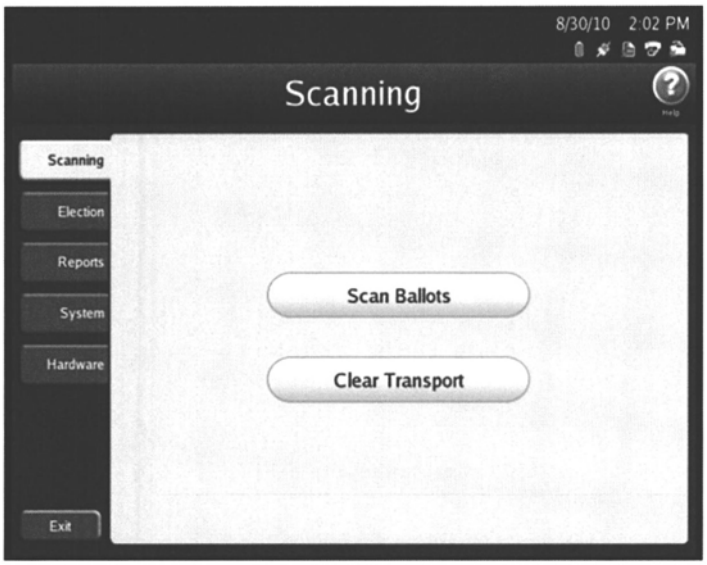
If the Sort Option is set to Disabled, the Sorting on/off button is not displayed on the scan ballots screens. However, sorting is performed as if the Sort Option was set to Enabled and the Sorting on/off button was set to On.

Mismatch of Ballot Counters

Upon restarting the DS850 (and logging in if necessary), the following screen will appear if the ballot counters do not match.

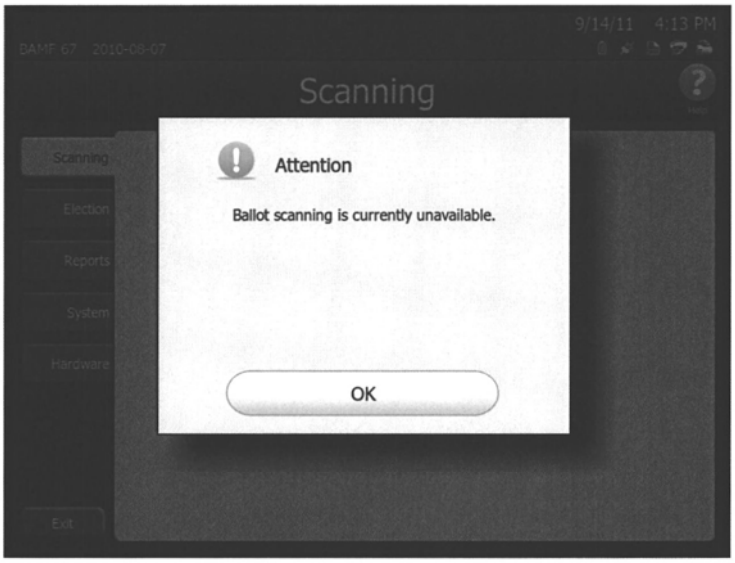


1. Press **OK**, the main menu screen will appear with the Scanning tab selected.

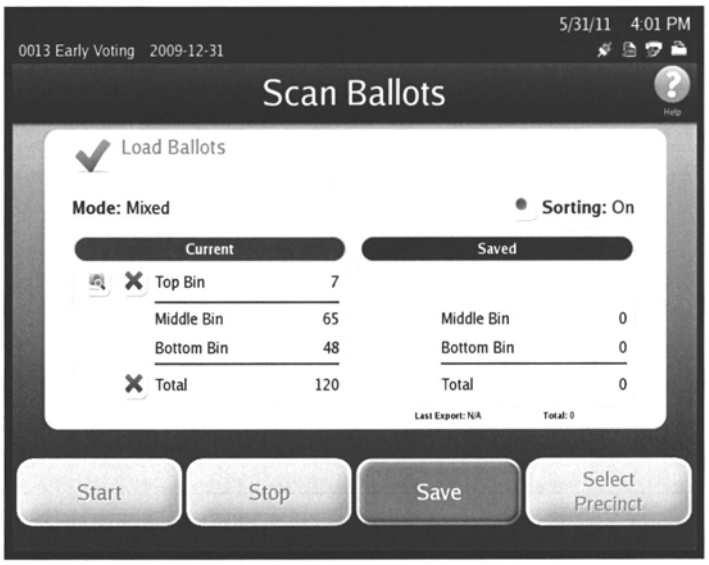


2. Press **Scan Ballots** and you will receive a screen informing you that ballot scanning is currently unavailable.

3. Press **OK** and you will be returned to the Scan Ballot screen.



4. The **Start** button will remain unavailable until you Clear and Initialize the scanner and reload the election from the Setup screen.



See the Clearing and Initializing the Scanner section in this chapter for information on clearing and initializing the scanner.

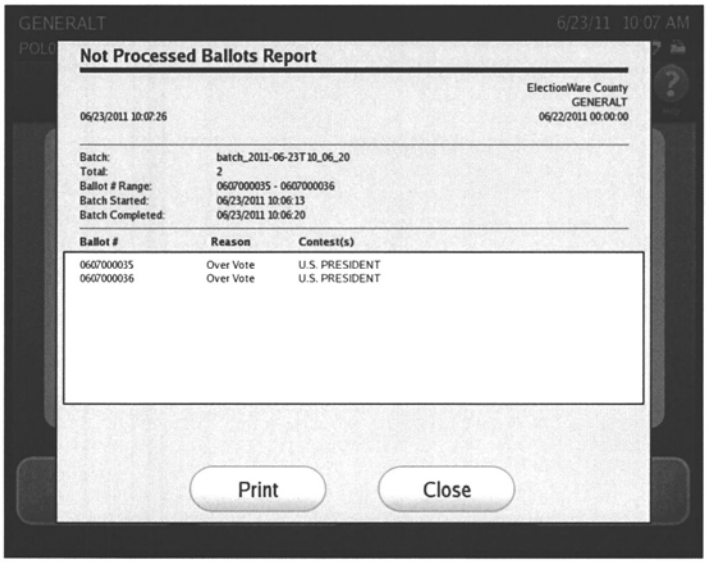
Not Processed Ballot Report

The DS850 can generate a "Not Processed Ballots Report" for the ballots that were out-stacked to the Top Bin.

1. Select the "magnifying glass" next to the Top Bin line in the Current column.

The Not Processed Ballots Report will appear on the screen:

2. Press **Print** to print a copy of the report or press **Close** to go back to the Scan Ballots screen.



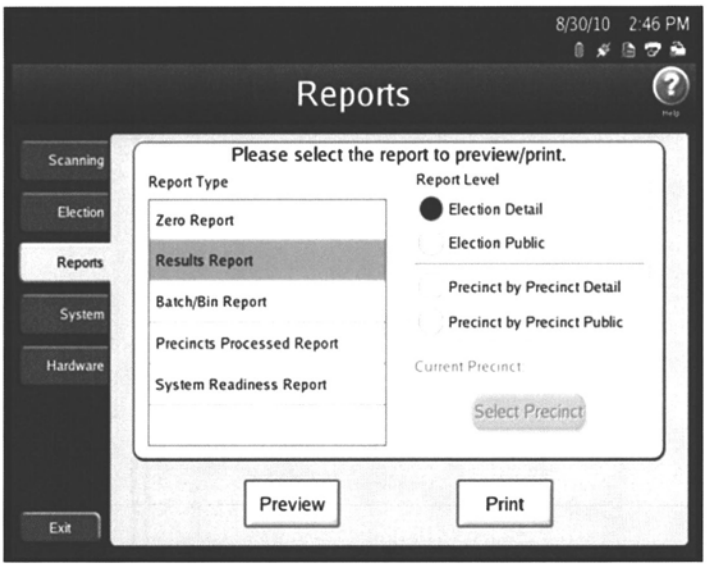
Printing Election Reports

The DS850 can generate a variety of results reports. You can manually select the desired reports from the Reports menu. Follow the instructions below to preview or print reports from the Reports menu.

Reference: See Chapter 8: Reports for information on the different report types and options that are available. The chapter also contains examples of the reports.

1. Select the desired report from the Reports menu.
2. If there are options associated with the selected report, set the desired options.
3. Press **Preview** to view the report on the touch screen, or press **Print** to print the report on the laser printer.

The following is an example of the Reports menu.



Exporting Data

Data saved to the scanner's internal memory can be exported to the Election Definition Media Device flash drive or to a blank USB flash drive. However, if a blank USB flash drive is used, it should be first fully formatted. Described below are the export functions that can be performed from the scanner.

Note: If you choose to use USB media device, it is strongly recommended that you use fully-formatted USB media device flash drives rather than the Quick-formatted or cleared (all files deleted) flash drives. The fully-formatted flash drives work faster and are more reliable.

- **Export Results** copies the poll place collection data, the election definition, and the audit log to the Election Definition Media Device flash drive or a fully-formatted ES&S Media Device flash drive. All of the copied data, except for the audit log, is encrypted. The data can be pulled into the Election Reporting Manager (ERM) to be consolidated with vote data from other devices (e.g., DS200) to generate the election results. The data can also be used in ERM to generate reports.

Reference: See Export Results for the steps to follow to perform this function.

- **Export Files** copies the poll place collection data, the election definition, the gathered ballot data (including ballot images) of any scanned ballot that was not out-stacked and the audit log to the Election Definition Media Device flash drive or a fully-formatted ES&S Media Device flash drive. All of the copied data, except for the audit log, is encrypted.

Reference: See Export Files for the steps to follow to perform this function.

- **Backup** copies the gathered ballot data (including ballot images), marked for inclusion in the Election Definition, all the cast vote records, the election definition, and the audit log to the Election Definition Media Device flash drive or a fully-formatted ES&S Media Device flash drive. All of the copied data, except for the audit log, is encrypted.

Reference: See Backup for the steps to follow to perform this function.

- **Export Audit Log** copies the audit log to the Election Definition Media Device flash drive or a fully-formatted ES&S Media Device flash drive. The audit log is not encrypted. If a problem occurs, or if there is a question about the exact sequence of events, the audit log copied to the flash drive can be examined on a PC.

Reference: See Export Audit Log for the steps to follow to perform this function.

Export Results

Follow the steps below to perform the Export For Results function:

1. Press **Election** to display the Election menu.

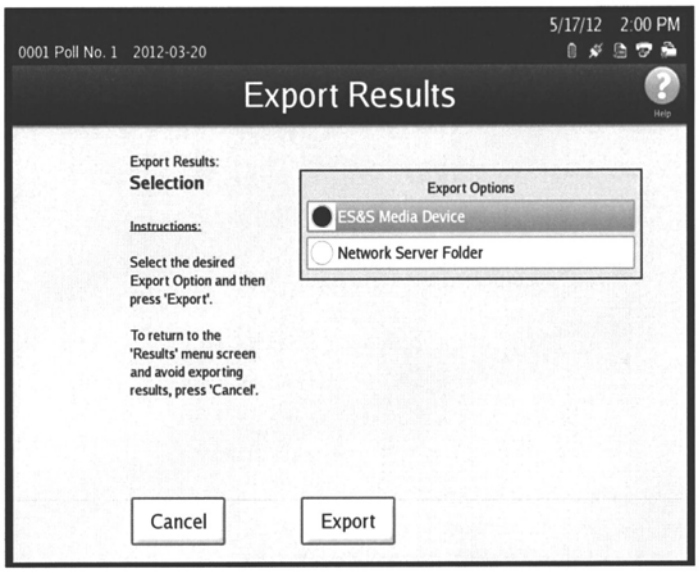
2. From the Election menu, press **Results** to display the Results screen.
3. From the Results screen, press **Export Results**. This displays the *Searching for ES&S Media Device* pop-up screen.
4. Insert the Election Definition Media Device flash drive or a blank ES&S Media Device flash drive into one of the scanner's USB ports. The previous pop-up screen is temporarily replaced by a *Detecting inserted device* pop-up screen. Then, the Election Code screen appears.

Reference: See Using USB Media Devices for instructions.

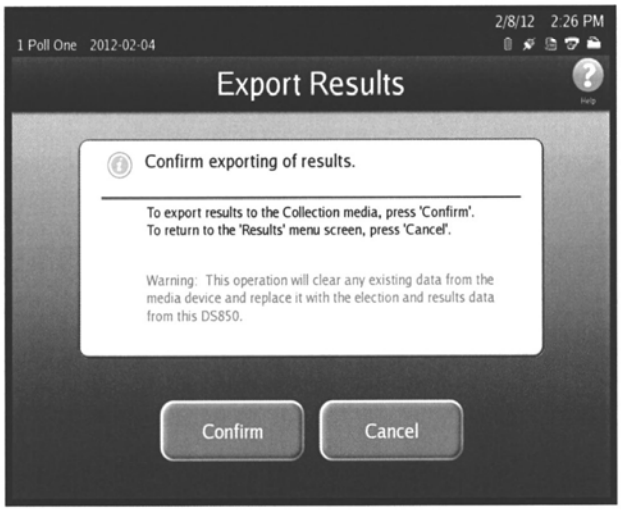
5. Enter the Election Code and then press **Accept**.

6. Select where you would like to export the files.
   - **USB Media Device**
   - **Network Server Folder** - folder located on server

Press **Export** to export the files to your USB media device.

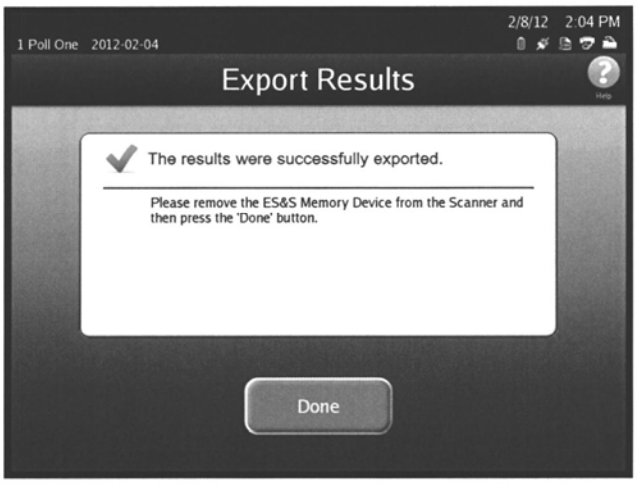


7. When the Export Results screen appears, press **Confirm** to confirm that you want to export the data, or press **Cancel** to cancel the process. If you press **Confirm**, the DS850 clears any existing data from the media device. Then it collects the saved cast vote records that were marked for inclusion in the collection process, generates the vote results, and exports those results to the USB flash drive, along with the election definition and the audit log. While this process is occurring, a pop-up screen will display indicating that the batch data is being collected and exported.



Note: The saved cast vote records for ballots that are diverted to the Processed bin (bottom bin) and to the Ballots with Write-ins bin (middle bin) are marked for inclusion in the collection process. The saved cast vote records for ballots that are diverted to the Not Processed bin (top bin) are marked for exclusion from the collection process. See Bin Sorting for more information.

8. The Export for Results screen will indicate when the data has been successfully exported. Remove the flash drive. Then press **Done** to return to the Results screen.



Export Files

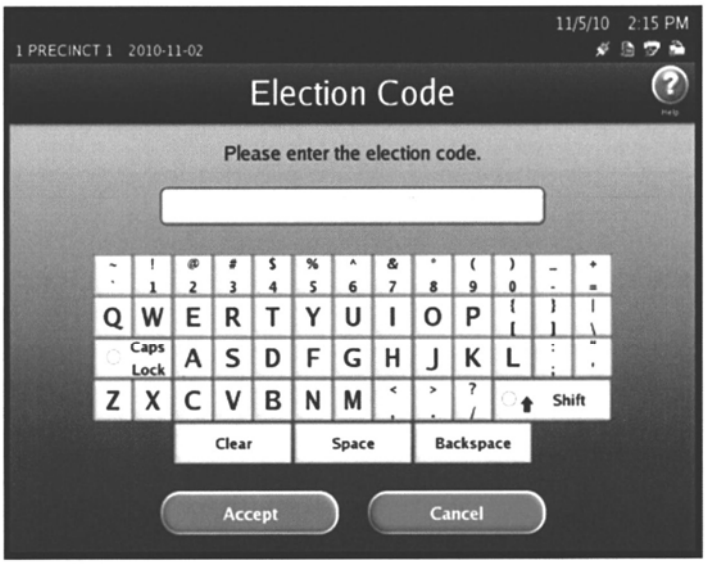
Follow the steps below to perform the Export Files function:

1. Press **Election** to display the Election menu.
2. From the Election menu, press **Results** to display the Results screen.
3. From the Results screen, press **Export Files** This displays the *Searching for ES&S Media Device* pop-up screen.

4. Insert the Election Definition Media Device flash drive or a blank ES&S Media Device flash drive into one of the scanner's USB ports. The previous pop-up screen is temporarily replaced by a *Detecting inserted device* pop-up screen. Then, the Election Code screen appears.

Reference: See Using USB Media Devices for instructions.

5. Enter the Election Code and then press **Accept**.



6. Select where you would like to export the files.
   - **USB Media Device**
   - **Network Server Folder** - folder located on server
7. Press **Export** to export the files to your USB media device.

8. When the Export Files confirmation screen appears, press **Confirm** to confirm that you want to export the data, or press **Cancel** to cancel the process. If you press **Confirm**, the DS850 clears any existing data from the media device. Then it collects the saved cast vote records that were marked for inclusion in the collection process, generates the vote results, and exports those results to the USB flash drive, along with the election definition, gathered ballot data (including ballot images) of any scanned ballot that was not out-stacked, and the audit log. While this process is occurring, a pop-up screen will display indicating that the batch data is being collected and exported.

Note: The saved cast vote records for ballots that are diverted to the Processed bin (bottom bin) and to the Ballots with Write-ins bin (middle bin) are marked for inclusion in the collection process. The saved cast vote records for ballots that are diverted to the Not Processed bin (top bin) are marked for exclusion from the collection process. See Bin Sorting for more information.

Note: An option in the ElectionWare Deliver Module can be set to prevent images from being exported to a media device.

Reference: See the *ES&S ElectionWare Volume IV: Deliver User's Guide* for additional information on ElectionWare.

9. The Export Files screen will indicate when the data has been successfully exported. Remove the flash drive. Then press **Done** to return to the Results screen.

Backup

Follow the steps below to perform the Archive Data function:

1. Press **Election** to display the Election menu.
2. From the Election menu, press **Results** to display the Results screen.
3. From the Results screen, press **Backup**. The Election Code screen appears.

4. Enter the Election Code and then press **Accept**.

5. When you have successfully entered the Election Code, the Backup selection screen appears.

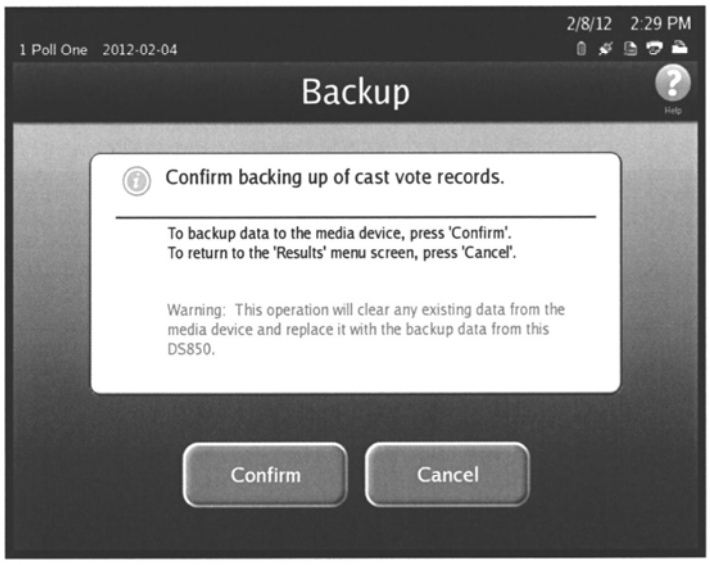
6. Select from one of the following options:
   - Export
   - Collect

7. Insert the Election Definition Media Device flash drive or a blank ES&S Media Device flash drive that you want to use as the target media device. The *Detecting inserted device* pop-up screen is displayed briefly. The message in red on the Archive Data selection screen disappears, and the inserted flash drive is listed in the Media Devices field.

Reference: See Using USB Media Devices for instructions.

8. Select the target device from the list in the Media Devices field, by pressing it. When you press your selection, it is highlighted in blue, as shown below.
9. If you press **Confirm**, the Backup confirmation screen appears. Press **Cancel** to cancel the process.

While the process is occurring, a pop-up screen indicating that the data is being gathered and archived is displayed briefly.



10. The Archive Data screen will indicate when the data has been archived successfully. Remove the flash drive. Then press **Done** to return to the Results screen.

Export Audit Log

Follow the steps below to perform the Export Audit Log function:

1. Press **Election** to display the Election menu.
2. From the Election menu, press **Results** to display the Results screen.

3. From the Results screen, press **Export Audit Log**. This displays the *Searching for ES&S Media Device* pop-up screen.
4. Insert the Election Definition Media Device flash drive or a blank ES&S Media Device flash drive into one of the scanner's USB ports. The previous pop-up screen is temporarily replaced by a *Detecting inserted device* pop-up screen. Then, the Election Code screen appears.

Reference: See Using USB Media Devices for instructions.

5. Enter the Election Code and then press **Accept**.

6. When the Export Audit Log screen appears, press **Confirm** to confirm that you want to export the audit log, or press **Cancel** to cancel the process. If you press **Confirm**, a pop-up screen will display indicating that the audit log is being exported.

7. The Export Audit Log screen will indicate when the audit log has been successfully exported. Remove the flash drive. Then press **Done** to return to the Results screen.

Clearing Election Results

You can choose to clear all election results or the election results for only a specified precinct.

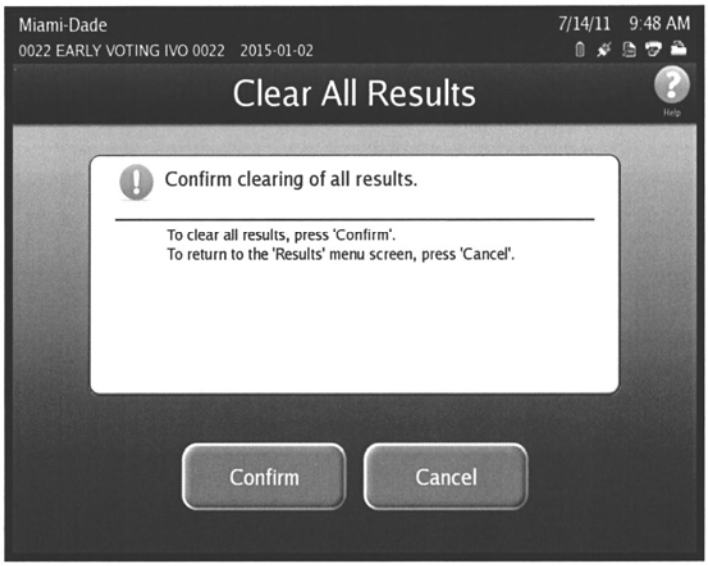
Clear All Results

Follow the steps below to clear all election results.

1. Press **Election** to access the Election menu.
2. From the Election menu, press **Results** to display the Results screen.
3. On the Results screen, press **Clear All Results**.

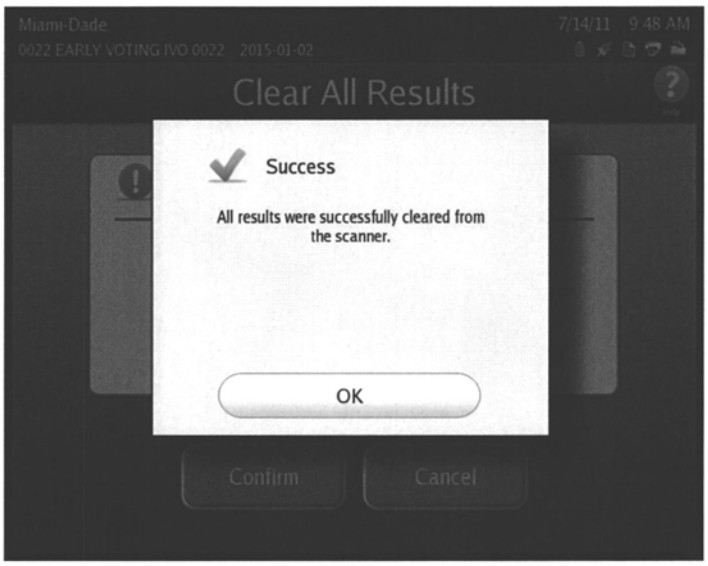
4. When prompted, enter the Override Code and then press **Accept**.

5. When the Clear All Results confirmation screen appears, press **Confirm** to clear all election results, or press **Cancel** to cancel the clear results process.



6. If you press **Confirm**, a pop-up screen will appear briefly to indicate that the results are being cleared. When the results have been cleared successfully, the following pop-up screen will display. Press **OK** to close the pop-up screen.

All counts displayed on the Main Scan Ballot screen (including the Last Export Total) are now zeroed-out.



Clear a Precinct's Results

Follow the steps below to clear the election results for a single precinct.

1. Press **Election** to access the Election menu.
2. From the Election menu, press **Results** to display the Results screen.

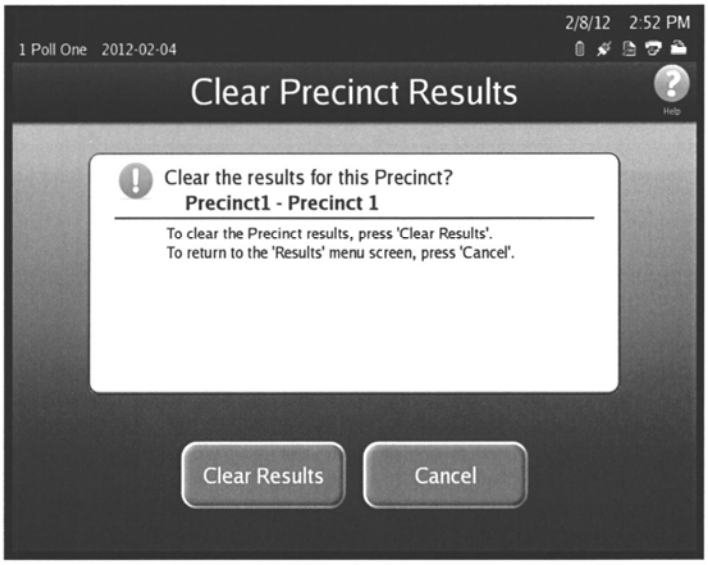
3. On the Results screen, press **Clear A Precinct**.

4. When prompted, enter the Override Code and then press **Accept**. The initial Select Precinct screen is displayed.

5. From the sequence of Select Precinct screens, search for and select the precinct whose election results you want to clear.

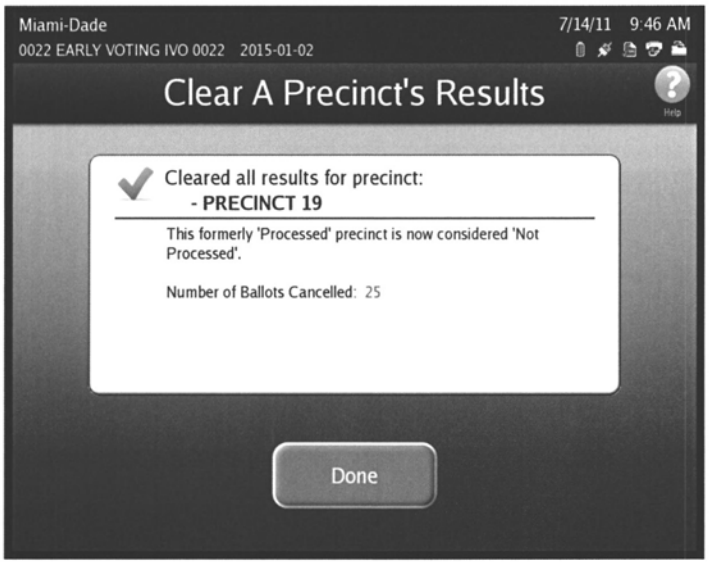
Reference: See the Select a Precinct section for the steps to follow to search for and select a precinct.

6. When the Clear A Precinct's Results screen appears, press **Clear Results** to clear the election results for the selected precinct, or press **Cancel** to cancel the clear results process.



7. If you press **Clear Results**, a pop-up screen will appear briefly to indicate that the precinct's results are being cleared. When the results for the specified precinct have been cleared successfully, the Clear A Precinct's Results screen is displayed with a message indicating that the results for the specified precinct have been cleared. Press **Done** to close the screen.

In the "Saved" column on the Main Scan Ballots screen, any Middle or Bottom Bin ballot counts specifically for the cleared precincts are subtracted from their respective bin counts and added to Top Bin (Not Processed) count.



Chapter 7: Post-Election Day Tasks

This chapter identifies the maintenance and other tasks that must be performed after the Election Day tasks have been completed.

Reference: See the *ES&S DS850 System Maintenance Manual* for additional information about scanner maintenance procedures.

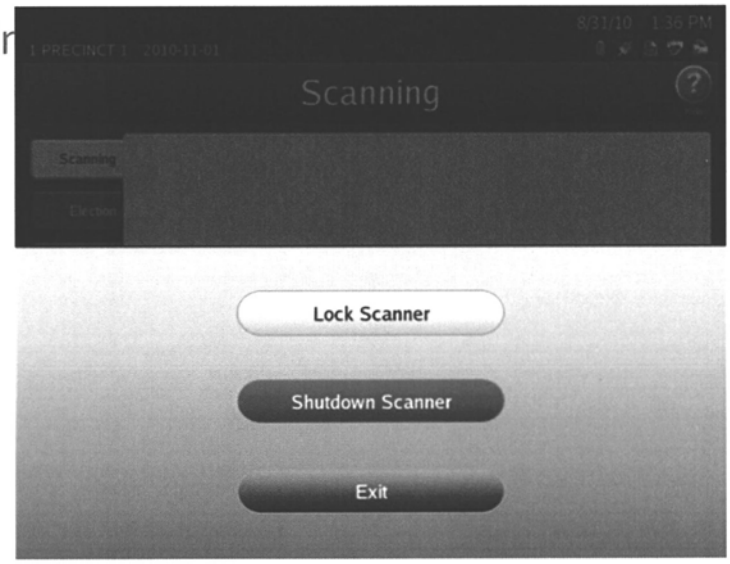
Shut Down and Power Off the Scanner

After the post-election day maintenance has been completed, shut down and power off the DS850, and then prepare the machine for physical storage.

Follow the steps below to shut down and power off the DS850:

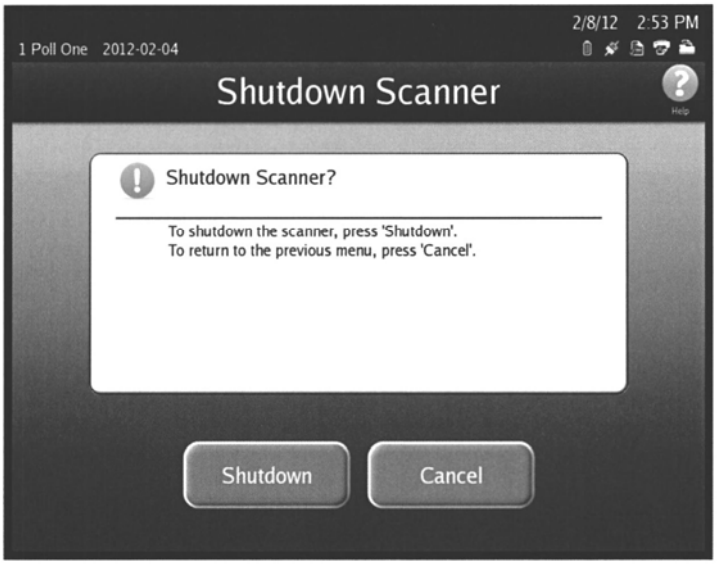
1. Press **Exit** in the lower left-hand corner of the screen to display the Exit screen.

2. From the Exit screen, press **Shutdown Scanner** to access the Shutdown Scanner screen.



3. On the Shutdown Scanner screen, press **Shutdown** to shut down the scanner, or press **Cancel** to leave the scanner running.

4. If you press **Shutdown**, a message will display to let you know when it is safe to turn off the machine. When the message is displayed, flip the power switch to the off position. The power switch is located on the left side of the machine.



Turn Off the UPS

After you have shut down and powered off the scanner, press the power switch on the UPS to turn it off.

Perform Scanner Maintenance

After the Election Day tasks have been completed, perform the following maintenance tasks to keep your DS850 scanner in proper working order:

- Clean the rollers; see Clean the Rollers in Pre-Election Maintenance for instructions.
- Clean the cameras; see Clean the Cameras in Pre-Election Maintenance for instructions.
- Clean the scanner case; see Clean the Scanner Case in Pre-Election Maintenance for instructions.
- Clean the touch screen; see Clean the Touch Screen in Pre-Election Maintenance for instructions.

Perform UPS Maintenance

Ensure that the manufacturer's maintenance procedures are followed so that the UPS will perform as required on the next Election Day.

Recommended Steps to Prepare the DS850 for Storage

1. Print final copies of reports (if required).
2. Remove the election definition and results media.
3. Remove the paper audit report from the audit printer.
4. Zero the scanner.
5. Power off and unplug the scanner, printer and UPS.
6. Secure all power cords, spare parts and election materials in the drawer of the scanner cart. Store cords and spare materials in a manner that prevents them from becoming tripping hazards.
7. Perform Scanner Maintenance as listed above.
8. Inspect the equipment for damage.
9. Log any issues for follow-up with the ES&S Election Support team.
10. Secure the scanner output trays.
11. Lock and seal all panels and scanner doors.
12. Store the scanner in a secure physical location. At a minimum ES&S recommends storing the scanner in a locked room and enforcing access control on the room where the voting equipment is stored.
13. Store your election definition, audit log, final results reports, final results media and any other election artifacts, in accordance with the laws of your jurisdiction. Federal voting system guidelines do require storage of this material in a secure location for a minimum of 22 months.
14. Follow manufacturer recommendations for environmental storage conditions for all your election materials. (See Specifications and Cautions for storage requirements of the DS850).

Part 3: Appendix

The Appendix contains the following chapters:

- Chapter 8: Reports
- Chapter 9: DS850 Network
- Chapter 10: System Messages
- Chapter 11: Menu Structure
- Chapter 12: Troubleshooting
- Chapter 13: Revision History

Chapter 8: Reports

This chapter contains descriptions and examples of the report that can be generated on the DS850. Use the information in this chapter to become familiar with the types of reports available so that you can generate the proper reports for your jurisdiction.

The report types listed below are generated from the Reports screen, which is displayed when you select the Reports menu.

- Zero Report
- Results Report
- Batch/Bin Report
- Precincts Processed Report
- System Readiness Report

Note: The Digital Readings and Mark Code reports cannot be generated from this Reports menu. They are generated from a different Reports screen, which is accessed through the Hardware menu. See Chapter 3: DS850 User Interface for more information on the Digital Readings and Mark Code reports.

Zero Report

Use the Zero Report to ensure all of your contests have zero votes before you begin scanning ballots. The report displays zeros for all contests, indicating that no ballots have been scanned. You cannot print this report after ballots have been scanned on the DS850.

The following is an example of the screen that is displayed when the Zero Report is selected from the Reports menu.

Follow the steps below to preview or print the Zero Report:

1. From the Reports menu, press **Zero Report** in the **Report Type** field.
2. Press **Preview** to the view the report on the touch screen, or press **Print** to print the report on the laser printer.

The following is an example of the Zero report.

1 of 2

Zero Report

BMW DEMO
BMW (English Only) DEMO
11/02/2010 11:14:18

02/02/2010 16:02:25

First Ballot Date Time:
Last Ballot Date Time

Ballots Cast Total: 0

Contest	Votes
BEST AUTOMOBILE MANUFACTURER	
(Vote For 1)	
BMW	0
MERCEDES	0
GENERAL MOTORS	0
HONDA	0
FERRARI	0
JAGUAR	0
FORD	0
VOLVO	0
Write In	0
Over Votes	0
Under Votes	0
Total	**0**
BEST VOCAL ARTIST	
(Vote For 2)	
FRANK SINATRA	0
ELVIS	0
PATSY CLINE	0
JANIS JOPLIN	0
BUDDY HOLLY	0
BARRY WHITE	0
BILLIE HOLIDAY	0
STEVIE RAY VAUGHAN	0
"MAMA" CASS ELLIOT	0
Write-In	0
Write-In	0
Over Votes	0
Under Votes	0
Total	**0**
BEST ICE-CREAM FLAVOR	
(Vote For 1)	
CHOCOLATE	0
STRAWBERRY	0
VANILLA	0
Write-In	0
Over Votes	0
Under Votes	0
Total	**0**
PROPOSITION 1	

Zero Report (continued)

Zero Report

2 of 2

BMW DEMO
BMW (English Only) DEMO
11/02/2010 11:14:18

02/02/2010 16:02:25

First Ballot Date Time:
Last Ballot Date Time:

Ballots Cast Total: 0

Contest	Votes
(Vote For 1)	
YES	0
NO	0
Over Votes	0
Under Votes	0
Total	**0**
PROPOSITION 2	
(Vote For 1)	
YES	0
NO	0
Over Votes	0
Under Votes	0
Total	**0**

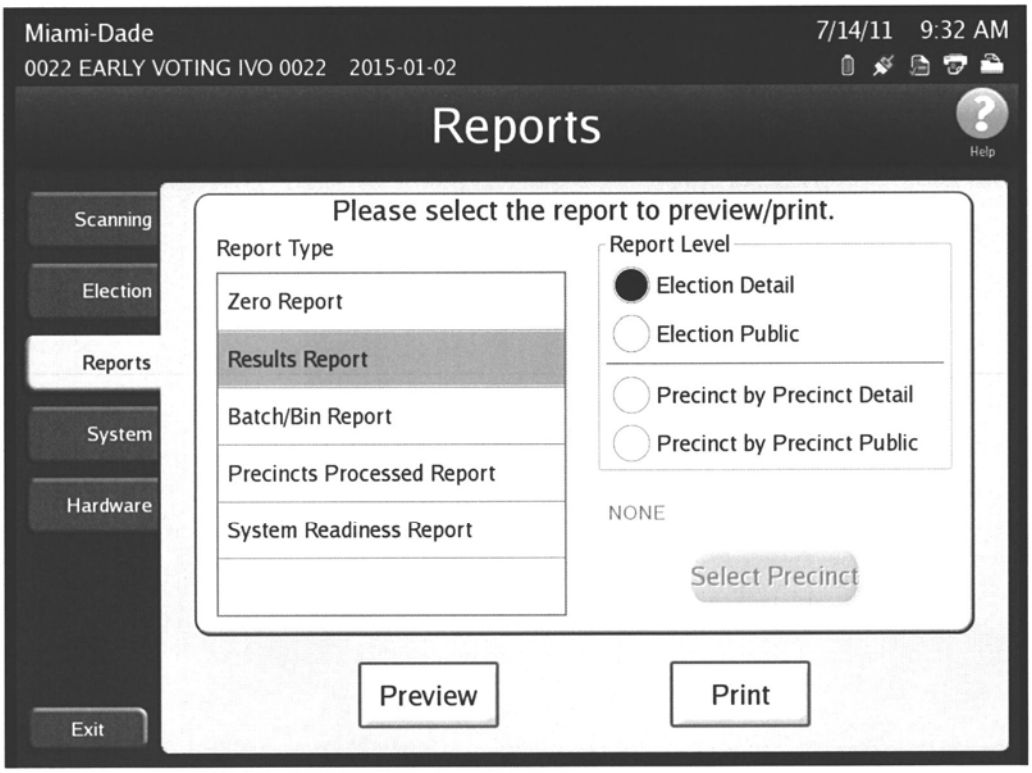
Results Report

The Results Report contains detailed election results and is available in multiple report levels. The following are the report level options for the Results Report:

- **Election Detail** - The report displays detailed contest totals for the whole election.
- **Election Public** - The report displays contest totals for the whole election without including overvote and undervote information.
- **Precinct by Precinct Detail** - The report displays detailed contest totals for the selected precinct.
- **Precinct by Precinct Public** - The report displays contest totals for the selected precinct without including overvote and undervote information.

You must specify a precinct if you select the **Precinct by Precinct Detail** or **Precinct by Precinct Public** report level.

The following is an example of the screen that is displayed when the Results Report is selected from the Reports menu.



Follow the steps below to preview or print the Results Report:

1. From the Reports menu, press **Results Report** in the **Report Type** field.
2. Select the desired report level by pressing the option button to the left of the selection in the **Report Level** field.
3. If you selected the **Election Detail** or **Election Public** report level, skip to Step 4. If you selected the **Precinct by Precinct Detail** or **Precinct by Precinct Public** report level, a **Select Precinct** button is displayed. Press the **Select Precinct** button to select a precinct.

Reference: See Select a Precinct for the steps to follow to select a precinct.

4. Press **Preview** to the view the report on the touch screen, or press **Print** to print the report on the laser printer.

The following is an example of the Results Report.

1 of 2

Detail Results

BMW DEMO
BMW (English Only) DEMO
11/02/2010 11:14:18

02/02/2010 16:13:20

First Ballot Date Time:	02/02/2010 16:11:51	Ballots Cast Total:	7
Last Ballot Date Time:	02/02/2010 16:12:08		

Contest	Votes
BEST AUTOMOBILE MANUFACTURER	
(Vote For 1)	
BMW	1
MERCEDES	0
GENERAL MOTORS	1
HONDA	0
FERRARI	0
JAGUAR	1
FORD	0
VOLVO	1
Write-In	2
Over Votes	1
Under Votes	0
Total	**7**
BEST VOCAL ARTIST	
(Vote For 2)	
FRANK SINATRA	0
ELVIS	0
PATSY CLINE	1
JANIS JOPLIN	1
BUDDY HOLLY	0
BARRY WHITE	0
BILLIE HOLIDAY	0
STEVIE RAY VAUGHAN	2
"MAMA" CASS ELLIOT	0
Write-In	3
Write-In	4
Over Votes	0
Under Votes	3
Total	**14**
BEST ICE-CREAM FLAVOR	
(Vote For 1)	
CHOCOLATE	1
STRAWBERRY	2
VANILLA	1
Write-In	1
Over Votes	1
Under Votes	1
Total	**7**
PROPOSITION 1	

2 of 2

Detail Results

BMW DEMO
BMW (English Only) DEMO
11/02/2010 11:14:18

02/02/2010 16:13:20

First Ballot Date Time:	02/02/2010 16:11:51	Ballots Cast Total:	7
Last Ballot Date Time:	02/02/2010 16:12:08		

Contest	Votes
(Vote For 1)	
YES	3
NO	3
Over Votes	0
Under Votes	1
Total	**7**
PROPOSITION 2	
(Vote For 1)	
YES	4
NO	2
Over Votes	0
Under Votes	1
Total	**7**

Batch/Bin Report

The Batch/Bin reports contain ballot totals for the last batch that was saved. The totals are provided for the selected bin and report level. The following are the bin options:

- **Not Processed (Top Bin)** - The report contains totals for ballots that have not been processed and that have been diverted to the top bin.
- **Processed with Write-ins (Middle Bin)** - The report contains totals for ballots containing write-in votes that have been processed and diverted to the middle bin.
- **Processed (Bottom Bin)** - The report contains totals for all processed ballots that have been diverted to the bottom bin.

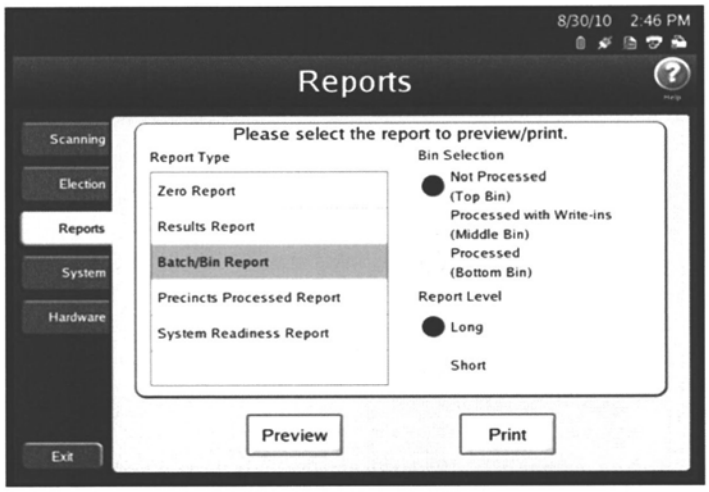
The following are the report level options:

- **Long** (detailed)
- **Short** (summary)

Note: ElectionWare provides the default settings for batch/bin reporting in the election definition. By default, no batch/bin reports are printed automatically when the user saves a scanned batch of ballots. If you want reports to print automatically when you save a batch of scanned ballots, you must use the Batch/Bin Reporting screen to specify the number of reports you want printed. See Batch/Bin Reporting for more information on that screen.

Reference: See the *ES&S ElectionWare Volume IV: Deliver User's Guide* for additional information on ElectionWare.

The following is an example of the screen that is displayed when the Batch/Bin Report is selected from the Reports menu.



Follow the steps below to preview or print the Batch/Bin Report:

1. From the Reports menu, press **Batch/Bin Report** in the **Report Type** field.
2. Select the desired bin by pressing on the option button to the left of it in the **Bin Selection** field.
3. Select the desired report level by pressing on the option button to the left of it in the **Report Level** field.
4. Press **Preview** to the view the report on the touch screen, or press **Print** to print the report on the laser printer.

The following is an example of a Batch/Bin Report.

1 of 1

Processed Ballots Report

BMW DEMO
BMW (English Only) DEMO
11/02/2010 11:14:18

02/02/2010 16:14:04

Batch:	batch_2010-02-02T16_12_08
Total:	7
Ballot # Range:	0001000008 - 0001000014
Batch Started:	02/02/2010 16:11:51
Batch Completed:	02/02/2010 16:12:08

Count	Election District
7	PRECINCT 1

Precincts Processed Report

The Precincts Processed report allows you to see which precincts have been processed and which have not been processed. The options for this report are:

- **Precincts Processed** - The report contains a list of the precincts that have been processed and the ballot counts for each.
- **Precincts NOT Processed** - The report contains a list of the precincts that have not been processed.

The following is an example of the screen that is displayed when the Precincts Processed Report is selected from the Reports menu.

Follow the steps below to preview or print the Precincts Processed Report:

1. From the Reports menu, press **Precincts Processed Report** in the **Report Type** field.
2. Select the desired report option by pressing on the option button to the left of it in the **Listing Selection** field.
3. Press **Preview** to the view the report on the touch screen, or press **Print** to print the report on the laser printer.

The following is an example of the Precincts Processed Report.

Precinct Processed Report

1 of 1

BMW DEMO
BMW (English Only) DEMO
11/02/2010 11:14:18

02/02/2010 16:14:31

Total:	7
First Ballot Time:	02/02/2010 16:11:51
Last Ballot Time:	02/02/2010 16:12:08

Code	Election District	Count
0001	PRECINCT 1	7

System Readiness Report

The System Readiness report is a descriptive list of system settings that you can use to verify that the DS850 is ready to begin ballot processing. The report prints automatically when the DS850 is powered on. The options for this report are:

The following is an example of the screen that is displayed when the System Readiness Report is selected from the Reports menu.

Follow the steps below to preview or print the System Readiness Report:

1. From the Reports menu, press **System Readiness Report** in the **Report Type** field.
2. Select the desired report option by pressing on the option button to the left of it in the **Report Options** field.
3. Press **Preview** to the view the report on the touch screen, or press **Print** to print the report on the audit log printer.

The following is an example of the System Readiness Report.

```
*** SYSTEM READINESS REPORT ***
12:10:50 Tue Dec 21 2010
Unit Serial Number: 0304050607

VOTING DEVICE INFORMATION

HARDWARE CONFIGURATION
Current Time Date: 12:10:50 Tue Dec 21 2010
Time Zone: America/Chicago
Processor: : Intel(R) Core(TM)2 Duo CPU     E6400  @ 2.13GHz
Total RAM: 4009 MB
Available RAM: 3841 MB
RAM Test Status: OK
Camera Interface: OK
Touch Screen: OK
Report Printer: OK
Battery: OK
Power Source: AC
Battery Charge: 100

STORAGE
Total Data Storage: 938901 MB
Available Data Storage: 890987 MB
Data Storage Device Status: OK

FIRMWARE
DS850 Firmware Version: 2.1.0.0j

Master Control Program: Running
Tabulation Engine: Running
Presentation Engine: Running

Protected Count: 15164

ELECTION LOADED

ELECTION STATUS
Election Name: VARINSTR
Election Date: 2006-01-16
Election EQC: Secret

*** END OF REPORT ***
```

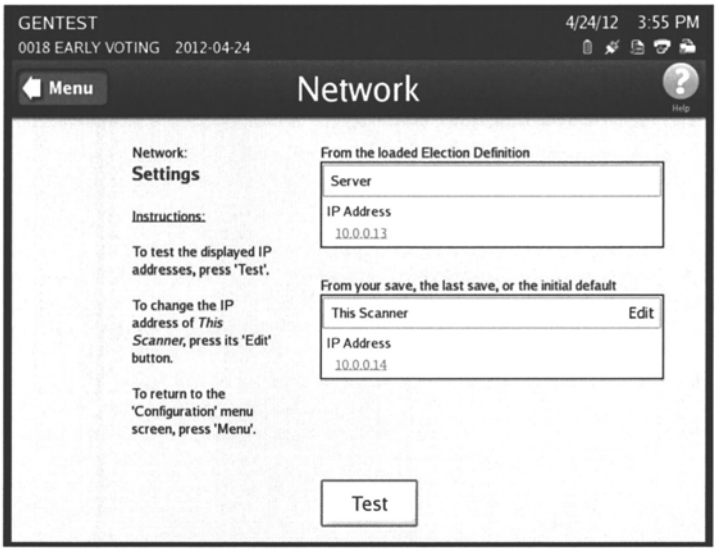
Chapter 9: DS850 Network

View, Set and Test Network IP Address and Folder Path

The network option will allow the user to send the results directly from the DS850 to process the election results.

1. Select **Configuration** on the Election screen to bring up the Configuration screen.
2. Select **Network** and you will be prompted to enter the Election Code.
3. Enter your Election Code in the entry field then press **Accept**.

The Network setting screen will appear and this will display the Server IP Address, Folder Path and it will also show the IP Address for the scanner.

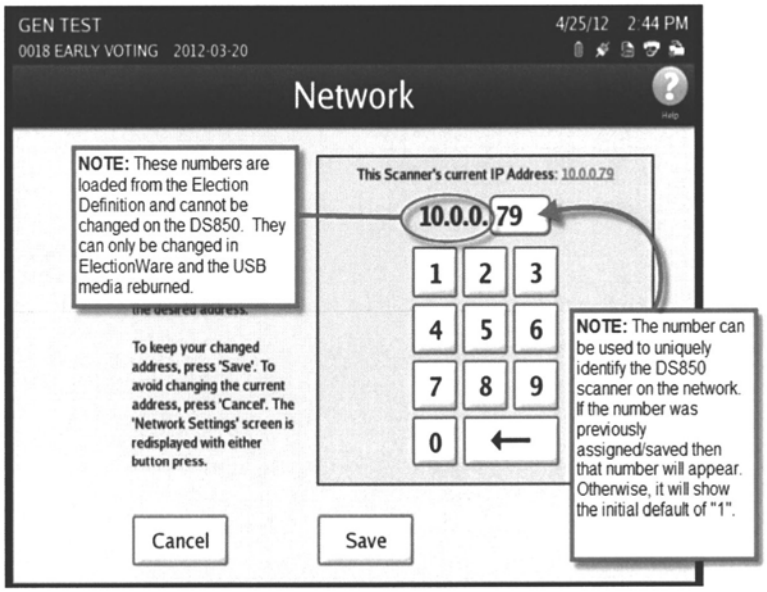


Note: The system will assign an initial default of "1" for the scanner's last address number.

4. To edit the IP Address for the scanner select **Edit.**

5. Type a number in the **Address Digit-box** for the scanner. Then select **Save** to save your changes or press **Cancel** to exit the screen without making any changes.

6. Once your IP Address is set then you can test the connection to the server, by pressing **Test**. The DS850 will test the folder path and IP address for the server. You will receive a message if it has been successful, then select **OK** to return to the Configuration screen.



Note: If the test was not successful check to make sure the path and IP addresses are correct.

Note: To export results to the network server see Exporting Data section in Chapter 6: Election Day Tasks

Chapter 10: System Messages

This chapter contains a list of all system messages. If you require assistance to resolve an issue related to a system message, contact your Election Administrator to schedule technical service or a back-up machine. Election Administrators can contact ES&S support at 877-377-8683.

Viewing Messages

Printed system messages can be seen on the continuous-feed print-outs from the Audit Log Printer. The Audit Log Printer must be connected to the DS850, enabled and properly configured (paper loaded, plugged-in, turned on, etc.). See *Chapter 5: Pre-Election Day Tasks*, Audit Log for more information.

Logged system message can be seen within the exported audit.log file. To create this file from the DS850, first insert a blank ES&S Media Device into one of the unit's USB ports. Then, select 'Election=> Results=> Export Audit Log'. Once the audit log is successfully written to the ES&S Media Device, insert the device into a PC. The Audit log file is located in the 'Log' folder on the Device. To view the file, open the file with an application such as WordPad™.

System Error Recovery

In the event that a critical error occurs that prevents further operation of the machine, an error number and error message are displayed, as well as the **Shutdown** button. Use the following procedure to restart the system and continue scanning ballots:

1. Write down the error number and message so that you can report that information to the appropriate personnel (i.e., an election official, system administrator, and/or support technician).
2. Press the **Shutdown** button on the touch screen and wait for a message to display indicating that it is safe to power off the machine.

Note: If the touch screen does not respond when you press **Shutdown** after 1 minute, or if the message indicating that it is safe to power off the machine does not appear after 5 minutes, proceed to step 3.

3. Flip the scanner's power switch to the off position.
4. Wait 30 seconds.

5. Flip the power switch to the on position to restore power to the entire machine.
6. On startup, make sure that any ballots for which data was lost are removed from the output bins and then re-scanned.

Numeric Messages

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009001 - Unknown communications error.	X			X	This message appears if some unknown communication problem occurs with the User Interface.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, a an ES&S Service Technician will need to be contacted.
1009002 - The connection was refused by the MCP.	X			X	This message appears when the Master Control Program will not accept a connection to the User Interface.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted.
1009003 - The MCP closed the connection.	X			X	This message appears when the Master Control Program terminates its connection with the User Interface.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009004 - The UI message server was unable to be started.	X			X	This message appears when the Master Control Program is unable to start the Property Bank Message Server for the User Interface.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Customer Service Representative will need to be contacted.
1009005 - MCP command syntax error.	X			X	This message appears when a command, sent from the User Interface to the Master Control Program, cannot be understood by the Master Control Program.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Customer Service Representative will need to be contacted.
1009006 - The client connection to MCP timed out.	X			X	This message appears when the connection of the User Interface to the Master Control Program is terminated due to the lack of response from the User Interface when the Master Control Program queries it over a limited period of time.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Customer Service Representative will need to be contacted.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009007 - The system has too many open sockets.	X			X	This message appears when the Master Control Program detects that there are so many unused communication link end-points, for its connection to the User Interface, that it can no longer effectively communicate with the User Interface.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Customer Service Representative will need to be contacted.
1009008 - MCP command unknown.	X			X	This message appears when a command, sent from the Master Control Program to the User Interface, cannot be understood by the User Interface.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Customer Service Representative will need to be contacted.
1009020 - MCP was unable to connect to the tabulation engine.	X			X	This message appears when the User has selected a collect results command (e.g. 'Export for Results') and the Master Control Program cannot access the tabulation engine to perform the command.	Write down the error message and notify an appropriate election official. Try the command again. If the problem persists, shutdown the Scanner, wait 30 seconds, restart the Scanner, and try the command again. If the problem still remains, an ES&S Customer Service Representative will need to be contacted.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009021 - No response from the tabulation engine.	X		X	X	This message appears when the User has selected a collect results command (e.g. 'Export for Results') and the Master Control Program sends the command to the tabulation engine. However, the tabulation engine does not acknowledge that it has received the command from the Master Control Program.	Write down the error message and notify an appropriate election official. Try the command again. If the problem persists, shutdown the Scanner, wait 30 seconds, restart the Scanner, and try the command again. If the problem still remains, an ES&S Customer Service Representative will need to be contacted.
1009022 - MCP was unable to send a command to the tabulation engine.	X		X	X	This message appears when the User has selected a collect results command (e.g. 'Export for Results') and the Master Control Program attempts but fails to send the command to the tabulation engine.	Write down the error message and notify an appropriate election official. Try the command again. If the problem persists, shutdown the Scanner, wait 30 seconds, restart the Scanner, and try the command again. If the problem still remains, an ES&S Customer Service Representative will need to be contacted.
1009050 - Unknown tabulator error during {1} command	X		X		This message appears when the User has selected a collect results command (e.g. 'Export for Results') and the tabulation engine received the command, but an error occurs during tabulation with the "{1}" process command. Note an actual process command appears in place of the "{1}".	Write down the error message and notify an appropriate election official. Try the command again. If the problem persists, shutdown the Scanner, wait 30 seconds, restart the Scanner, and try the command again. If the problem still remains, an ES&S Customer Service Representative will need to be contacted.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009500 - Camera Interface - Initialization failed.	X		X	X	This message appears at start-up when the system initialization of the BAPis Image Processor Board fails.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the processor is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009501 - Camera Interface - Undefined error	X		X	X	This message appears when the BAPis Image Processor encounters an undefined error.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the processor is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009502 - Camera Interface - No connection	X		X	X	This message appears when the Master Control Program cannot communicate with the BAPis Image Processor Board through the MCP/ BAP Interface.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the processor is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009503 - Camera Interface - Not implemented	X		X	X	This message appears when the Master Control Program cannot communicate with the BAPis Image Processor Board because the MCP/ BAP Interface is not operating.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the processor is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009504 - Camera Interface - No image data	X		X	X	This message appears when a ballot is scanned but no image data is collected through the MCP/BAP Interface.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009505 - Camera Interface - Bad CRC	X		X	X	This message appears upon initialization of the BAPis Image Processor Board when the Master Control Program receives a bad CRC (cyclic redundancy check) from the board, indicating there is a problem with the accuracy of data transmitted through the MCP/BAP Interface communication link.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009506 - Camera Interface - Configuration not accepted	X		X	X	This message appears upon initialization of the BAPis Image Processor Board when the system configuration parameters, provided through the MCP/BAP Interface are not accepted by the board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009507 - Camera Interface - Wrong device IDD	X		X	X	This message appears upon initialization of the BAPis Image Processor Board when board's returned device ID is not the one expected by the Master Control Program.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009508 - Camera Interface - Parameter not supported	X		X	X	This message appears upon initialization of the BAPis Image Processor Board when a system configuration parameter, provided through the MCP/BAP Interface is not supported by the board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009509 - Camera Interface - Image ID out of range	X		X	X	This message appears when a ballot is scanned but its resulting image ID is outside the range expected by the Master Control Program.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009510 - Camera Interface - Error memory allocation	X		X	X	This message appears upon initialization of the BAPis Image Processor Board when the board cannot allocate the minimum amount of memory required to collect the ballot images.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009511 - Camera Interface - Error cropping	X		X	X	This message appears when a ballot is scanned, but the BAPis Image Processor Board cannot properly crop the scanned image(s).	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009512 - Camera Interface - Buffer overflow	X		X	X	This message appears when a ballot is scanned and its resulting image data overflows the buffer of the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009513 - Camera Interface - Timeout	X		X	X	This message appears when the interaction between the BAPis Image Processor Board and the Datawin board requires a timeout to complete one or more processing steps.	Write down the error message and notify an appropriate election official. Hopefully the timeout is brief, so normal operations can resume without any User intervention. If the timeout lasts over 10 minutes, and if it is possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If long timeouts continue to occur, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009514 - Camera Interface - DMA Controller	X		X	X	This message appears if there is a problem with the DMA Controller on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009515 - Camera Interface - SRAM Memory controller	X		X	X	This message appears if there is a problem with the SRAM Memory Controller on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009516 - Camera Interface - Binarization module error	X		X	X	This message appears if there is a problem with the Binarization Module on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009517 - Camera Interface - Skew engine error	X		X	X	This message appears if there is a problem with the Skew Engine on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009518 - Camera Interface - FPGA JPEG encoder module error	X		X	X	This message appears if there is a problem with the FPGA JPEG Encoder Module on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009519 - Camera Interface - ADV2x2 JPEG 2000 module error	X		X	X	This message appears if there is a problem with the ADV2x2 JPEG 2000 Module on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009520 - Camera Interface - G-Link PCI error	X		X	X	This message appears if there is a G-Link PCI error on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009521 - Camera Interface - FPGA self test failed	X		X	X	This message appears if the FPGA self test failed on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009522 - Camera Interface - SDRAM self test failed	X		X	X	This message appears if the SDRAM self test failed on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009523 - Camera Interface - SRAM self test failed	X		X	X	This message appears if the SRAM self test failed on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009524 - Camera Interface - Image buffer exceeding maximum	X		X	X	This warning message appears when a ballot is scanned and its resulting image data exceeds the maximum limit of the image buffer on the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. Since a "buffer overflow" (see message 1009512) did not occur, the system should allow normal operations to resume. However, if normal operations are not allowed to resume, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009525 - Camera Interface - Document queue corruption detected	X		X	X	This message appears if the BAPis Image Processor Board detects corruption of the Document Queue.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009526 - Camera Interface - Image queue corruption detected	X		X	X	This message appears if the BAPis Image Processor Board detects corruption of the Image Queue.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009527 - Camera Interface - Image format not supported	X		X	X	This message appears if the BAPis Image Processor Board does not support the format of the scanned ballot image.	Write down the error message and notify an appropriate election official. Attempt to rescan the ballot in a different orientation (e.g. back of ballot facing up). If that does not work, set that ballot aside, with an appropriate note attached, for an election official to examine later. Then resume normal operations. If this error repeatedly occurs, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Customer Service Representative will need to be contacted.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009528 - Camera Interface - Reset mode not supported	X		X	X	This message appears if the system cannot reset the BAPis Image Processor Board to its initialized state.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009529 - Camera Interface - Missing end of image interrupt	X		X	X	This message appears if a ballot is scanned and the BAPis Image Processor Board cannot detect the interrupt signal that indicates the end of the image has been reached.	Write down the error message and notify an appropriate election official. The system should allow normal operations to resume. If this error repeatedly occurs, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009530 - Camera Interface - Camera does not support TLK RGB pattern	X		X	X	This message appears if a ballot is scanned and one or both of the scan-cameras transmits the ballot image to the BAPis Image Processor Board in the form of a TLK RGB pattern, which the board cannot process.	Write down the error message and notify an appropriate election official. One or both of the scan-cameras will need to be adjusted to transmit in a different image format, so an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to make the adjustment(s).
1009531 - Camera Interface - Cannot communicate with Virtex FPGA	X		X	X	This message appears if the BAPis Image Processor Board failed to communicate with a Virtex FPGA (field-programmable gate array) device.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, the Virtex FPGA may need to be replaced. Contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to fix the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009532 - Camera Interface - Cannot communicate with Spartan FPGA	X		X	X	This message appears if the BAPis Image Processor Board failed to communicate with a Spartan FPGA (field-programmable gate array) device.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, the Spartan FPGA may need to be replaced. Contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to fix the problem.
1009533 - Camera Interface - UART failed	X		X	X	This message appears if the BAPis Image Processor Board's UART (Universal Asynchronous Receiver/ Transmitter) Module failed to transmit data.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, the UART may need to be replaced. Contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to fix the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009534 - Camera Interface - USB failed standard command	X		X	X	This message appears if a standard command fails to be transmitted between the BAPis Image Processor Board and the ES&S Motherboard via a USB (Universal Serial Bus) connection.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009535 - Camera Interface - USB failed vendor specific command	X		X	X	This message appears if a "vendor specific" (ES&S) command fails to be transmitted between the BAPis Image Processor Board and the ES&S Motherboard via a USB (Universal Serial Bus) connection.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009536 - Camera Interface - USB function not supported	X		X	X	This message appears if data transmission capability is lost between the BAPis Image Processor Board and the ES&S Motherboard via a USB (Universal Serial Bus) connection.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009537 - Camera Interface - Processing started without image	X		X	X	This message appears if the BAPis Image Processor Board started processing without a scanned image being present.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009538 - Camera Interface - Image lost	X		X	X	This message appears if the BAPis Image Processor Board started processing with a scanned image, but somehow the image was lost before the processing was completed.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009539 - Camera Interface - Virtex FPGA generated empty interrupt	X		X		This message appears if the Virtex FPGA (field-programmable gate array) device's communication with the BAPis Image Processor Board generated an unexpected, empty interrupt.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, the Virtex FPGA may need to be replaced. Contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to fix the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009540 - Camera Interface - Error in image processor FLASH memory	X		X		This message appears if an error occurs within the FLASH Memory of the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009541 - Camera Interface - Unsupported camera command protocol	X		X		This message appears if the BAPis Image Processor Board receives an unexpected command (out of the established sequence of camera commands) to issue to the camera(s).	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009542 - Camera Interface - Invalid camera UART	X		X		This message appears if the BAPis Image Processor Board receives an invalid transmission from one of the camera UART (Universal Asynchronous Receiver/Transmitter) Modules.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, the UART may need to be replaced. Contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to fix the problem.
1009543 - Camera Interface - Camera did not acknowledge command	X		X		This message appears if the BAPis Image Processor Board issues a camera command, but the camera does not acknowledge receipt of the command.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009544 - Camera Interface - Illegal character from camera	X		X		This message appears if one of the cameras issues an illegal character in its response to a command from the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009545 - Camera Interface - Transport Error	X		X		This message appears if the Datawin Board relays a transport error, which effects the camera interface, to the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since both the BAPis and Datawin Boards are "COTS" (Commercial Off The Shelf) products, the ES&S Technician may have to contact a BAP or Datawin Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009546 - Bad mode	X		X	X	This generic message appears if the BAPis Image Processor Board receives a “bad mode” indication from either the Datawin Board or one of the two cameras.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since both the BAPis and Datawin Boards are “COTS” (Commercial Off The Shelf) products, the ES&S Technician may have to contact a BAP or Datawin Technician to diagnose the problem.
1009547 - Camera not responding to Camera Interface board	X		X	X	This message appears if one of the Camera Interface Boards is receiving commands from the BAPis Image Processor Board, but the corresponding camera itself is not responding to those commands.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since both the Camera Interface and BAPis Boards are “COTS” (Commercial Off The Shelf) products, the ES&S Technician may have to contact a BAP or Datawin Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009548 - No cameras responding to Camera Interface board	X		X	X	This message appears if both Camera Interface Boards are receiving commands from the BAPis Image Processor Board, but the cameras are not responding to those commands.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since both the Camera Interface and BAPis Boards are "COTS" (Commercial Off The Shelf) products, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009549 - Cannot open file to write image from Camera Interface board	X		X	X	This message appears if the image file, provided by the Camera Interface Board, cannot be opened by the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) products, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009552 - Unable to send file to Camera Interface board	X		X	X	This message appears if the BAPis Image Processor Board is unable to send a file to a Camera Interface Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Service Technician. Since both the Camera Interface and BAPis Boards are "COTS" (Commercial Off The Shelf) products, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009553 - Invalid Ballot Key for Camera Interface config INI file	X		X	X	This message appears at start-up when the system attempts to initialize a Camera Interface Board using an invalid ballot key for the Board's config INI file.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the Camera Interface Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009554 - Camera Interface thread not started	X		X	X	This message appears at start-up when the Master Control Program attempts to start a task-execution-thread for the Camera Interface process, but fails.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Customer Service Representative will need to be contacted.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009555 - Error setting ballot size	X		X	X	This message appears when an election is loaded and the BAPis Image Processor Board fails to set the ballot size.	Write down the error message and notify an appropriate election official. Repeat the Clear-Initialize and Load Election steps. If the same error reappears, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Customer Service Representative will need to be contacted.
1009565 - Camera Interface - No space for image	X		X	X	This message appears when a ballot is scanned and there is no room within the buffer of the BAPis Image Processor Board to store the image.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the BAPis Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009566 - Camera Interface - Error sending image	X		X	X	This message appears when a ballot is scanned and the Camera Interface Board fails to send the image to the BAPis Image Processor Board.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since both Camera Interface and the BAPis Boards are "COTS" (Commercial Off The Shelf) products, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009567 - Camera Interface - Camera no response	X		X	X	This message appears when the Scanner attempts to scan a ballot, but the Camera Interface Board(s) senses that there is no response from one or both of the cameras.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the Camera Interface Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009568 - Camera Interface - Transporter no response	X		X	X	This message appears when the Scanner attempts to scan a ballot, but the Camera Interface Board(s) senses that there is no response from the Ballot Transporter.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since the Camera Interface Board is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a BAP Technician to diagnose the problem.
1009700 - Input Tray: Empty	X				This message appears on the initial 'Scan Ballots' screen, just prior to scanning, when the Input Tray has no ballots to scan.	Put a stack of ballots, for the loaded election, into the Input Tray.
1009701 - Input Tray: Pick Error	X		X		During scanning, when the Scanner has trouble picking a ballot from the Input Tray, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Select either 'Scan More' or 'Done' from the error screen and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path).
1009702 - Input Tray: Double Pick	X				During scanning, when the Scanner picks more than one ballot from the Input Tray, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Select either 'Scan More' or 'Done' from the error screen and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path).

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009703 - Bottom Bin: Full	X				During scanning, when the Scanner diverts so many ballots to the Bottom Output Bin that they are about to exceed the maximum ballot capacity of the bin, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Select either 'Scan More' or 'Done' from the error screen and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path).
1009704 - Middle Bin: Full	X				During scanning, when the Scanner diverts so many ballots to the Middle Output Bin that they are about to exceed the maximum ballot capacity of the bin, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Select either 'Scan More' or 'Done' from the error screen and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path).
1009705 - Top Bin: Full	X				During scanning, when the Scanner diverts so many ballots to the Top Out-stack Bin that they are about to exceed the maximum ballot capacity of the bin, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Select either 'Scan More' or 'Done' from the error screen and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path).

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009706 - Transport: Ballot Jam	X				During scanning, when a ballot jams within the Transport Path, ballot scanning stops and an 'OK' popup screen appears, identifying the ballots left in the Transport Path. Pressing 'OK' dismisses the popup and this error message appears on a 'Scan Ballots' error screen.	Select either 'Scan More' or 'Done' from the error screen and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path). Selecting 'Scan More' will also provide on-screen steps for rescanning the ballots, which were left in the Transport Path.
1009707 - Transport: Ballot Length	X				During scanning, when the Scanner encounters an unexpected ballot length, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Select either 'Scan More' or 'Done' from the error screen and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path).
1009708 - Diverter: Decision Late	X		X		During scanning, when the timing of the decision to divert a ballot to a specific output bin is too late to activate the proper diverter(s), ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Carefully read the 'Scan Ballots' error screen. Then select either 'Scan More' or 'Done' and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path). Selecting 'Scan More' will also provide on-screen steps for rescanning the stack of ballots for the Current Batch.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009709 - Diverter: Wrong Bin	X		X		During scanning, when a ballot is diverted to the wrong output bin, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Carefully read the 'Scan Ballots' error screen. Then select either 'Scan More' or 'Done' and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path). Selecting 'Scan More' will also provide on-screen steps for rescanning the stack of ballots for the Current Batch.
1009710 - Main Motor: Error	X		X		During ballot scanning, when the Main Transport Path Motor encounters an error, ballot scanning stops and this message appears on an error screen.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, an ES&S Service Technician will need to be contacted. Since this motor is a "COTS" (Commercial Off The Shelf) product, the ES&S Technician may have to contact a Datawin Technician to diagnose the problem.
1009711 - Hopper Drive: Error	X		X		During scanning, when the mechanical drive for raising/lowering the ballot stack support plate (for either the Input Tray or the Bottom Output Bin) encounters a problem, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Select either 'Scan More' or 'Done' from the error screen and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path).

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009712 - PRECINCT LABELS: NOT SELECTED	X				This message appears on the initial 'Scan Ballots' screen, just prior to scanning, when the election Processing Mode is “By Style” and “NONE” appears in the Precinct Label field. **Note:** An actual name (e.g. Precinct, Borough, etc..) will appear in the place of “Precinct label.	Press the screen's 'Precinct Label' button and follow the on-screen instructions to select a precinct.
1009713 - Safety: Service Panel Open	X				During scanning, when the large Service Panel is opened on the back of the Scanner, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Close the Service Panel. Carefully read the 'Scan Ballots' error screen. Then select either 'Scan More' or 'Done' and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path). Selecting 'Scan More' will also provide on-screen steps for rescanning the stack of ballots for the Current Batch.
1009714 - Safety: Camera Open	X				During scanning, when the hinged, upper camera housing is opened, revealing upper the Transport Path, ballot scanning stops and this error appears on a 'Scan Ballots' error screen.	Close the upper camera housing. Carefully read the 'Scan Ballots' error screen. Then select either 'Scan More' or 'Done' and follow the on-screen instructions for clearing the error (which includes clearing the Ballot Transport Path). Selecting 'Scan More' will also provide on-screen steps for rescanning the stack of ballots for the Current Batch.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009715 - Report Printer: Out Of Paper					Occurs when the Report Printer runs out of paper. The control panel on the Report Printer gives the only indication that the printer is out of paper.	Add paper to the Report Printer's paper tray.
1009716 - Report Printer: Not Detected					Occurs when the Report Printer is either not on or the USB cable connection between the Printer and Scanner is disconnected.	Make sure the Report Printer is turned on. Make sure the Printer's USB cable is securely connected to the Printer and to a USB port on the Scanner.
1009717 - Log Printer: Out Of Paper	X	X	X		Occurs when the Scanner attempts to access the Log Printer and the Printer has run out of paper. An 'OK' popup screen indicates that the Printer cannot be accessed or has run out of paper. This temporarily stops scanning, but does not result in a "system halt, which requires the DS850 to be rebooted.	Select 'OK' to dismiss the popup and add paper to the Log Printer's paper tray.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009718 - Log Printer: Not Detected	X				Occurs when the Scanner attempts to access the Log Printer and the Printer's USB cable has been disconnected from the Scanner. An 'OK' popup screen indicates that the Printer cannot be accessed or has run out of paper. This temporarily stops scanning, but does not result in a "system halt, which requires the DS850 to be rebooted.	Select 'OK' to dismiss the popup and make sure the Printer's USB cable is securely connected to the Printer and to a USB port on the Scanner.
1009719 - Power: On Battery	X		X		Occurs AC power from the wall outlet to the UPS (Uninterruptible Power Supply) battery backup system is lost. The system brings the Scanner to a gentle-stop: stops picking ballots, finishes scanning picked ballots, and clears the Transport Path. An 'OK' popup screen indicates that the Scanner is on battery power, additional ballots cannot be scanned, and a forced shutdown will occur if AC power is not restored. An "open power plug" icon on the upper right side of the screen also indicates that AC power has been lost.	Select 'OK' to dismiss the popup. Select 'Done' on the 'Scan Ballots' screen and either save or delete the Current Batch. Check the power cord connecting the UPS system to the wall outlet to make sure all connections are secure and in place. Make sure the wall outlet has power; a fuse may have blown, a breaker tripped, or the outlet itself may be bad. If necessary, switch to a good, powered wall outlet. If AC power cannot be restored, eventually a forced shutdown of the Scanner will occur. If a forced shutdown does occur, notify an appropriate election official.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009720 - Light Barrier: #02 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered "Light Barrier Blocked" messages will appear along with the "Safety: Camera Open" and/or "Light Barrier: Camera Blocked" messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the "Ready to Scan Ballots" heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.
1009721 - Light Barrier: #03 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered "Light Barrier Blocked" messages will appear along with the "Safety: Camera Open" and/or "Light Barrier: Camera Blocked" messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the "Ready to Scan Ballots" heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009722 - Light Barrier: #04 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered "Light Barrier Blocked" messages will appear along with the "Safety: Camera Open" and/or "Light Barrier: Camera Blocked" messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the "Ready to Scan Ballots" heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.
1009723 - Light Barrier: #05 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered "Light Barrier Blocked" messages will appear along with the "Safety: Camera Open" and/or "Light Barrier: Camera Blocked" messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the "Ready to Scan Ballots" heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009724 - Light Barrier: #06 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered “Light Barrier Blocked” messages will appear along with the “Safety: Camera Open” and/or “Light Barrier: Camera Blocked” messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the “Ready to Scan Ballots” heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.
1009725 - Light Barrier: #07 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered “Light Barrier Blocked” messages will appear along with the “Safety: Camera Open” and/or “Light Barrier: Camera Blocked” messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing	Close the upper camera housing. If ballots are in the Input Tray, the “Ready to Scan Ballots” heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009726 - Light Barrier: #08 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered "Light Barrier Blocked" messages will appear along with the "Safety: Camera Open" and/or "Light Barrier: Camera Blocked" messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the "Ready to Scan Ballots" heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.
1009727 - Light Barrier: #09 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered "Light Barrier Blocked" messages will appear along with the "Safety: Camera Open" and/or "Light Barrier: Camera Blocked" messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the "Ready to Scan Ballots" heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009728 - Light Barrier: #10 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered “Light Barrier Blocked” messages will appear along with the “Safety: Camera Open” and/or “Light Barrier: Camera Blocked” messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the “Ready to Scan Ballots” heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.
1009729 - Light Barrier: #11 Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, one or more of these numbered “Light Barrier Blocked” messages will appear along with the “Safety: Camera Open” and/or “Light Barrier: Camera Blocked” messages on the initial 'Scan Ballots' screen. Each numbered light barrier represents a different transmitter-receptor device under the camera housing.	Close the upper camera housing. If ballots are in the Input Tray, the “Ready to Scan Ballots” heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009730 - Light Barrier: Camera Blocked	X				Prior to scanning, if the hinged, upper camera housing is partially or fully opened, this message, one or more numbered “Light Barrier Blocked” messages, and the “Safety: Camera Open” messages may appear on the initial 'Scan Ballots' screen.	Close the upper camera housing. If ballots are in the Input Tray, the “Ready to Scan Ballots” heading should appear on the screen. If you press the 'Start' button, a Clear Transport Path process will automatically occur before ballot scanning starts.
1009731 - Storage: Disk Space Low	X		X		When 'Save' is pressed to save the Current Batch, if the available memory space is low for storing data on the Scanner's internal hard drive, this error will occur and a related 'OK' popup screen will appear.	Write down the popup's error message and notify an appropriate election official. Select 'OK' to dismiss the popup. If this is the first time you have seen this popup, the save procedure should continue and be completed successfully. Go to the 'Results' menu screen, select 'Archive Data' and follow the on-screen information to export archive data to a selected Target Media Device. Once you have successfully archived the data, select 'Clear All Results' from the 'Results' menu screen. This should free-up enough memory space to allow the scanning and saving of Current Batches to continue for quite some time.
1009750 - Syslog process terminated	X			X	This message appears if the System's process of logging messages suddenly stops.	Write down the error message and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Customer Service Representative for assistance.

System Messages

NOTE: A System Halt is a condition which requires the DS850 to be shutdown. It is not a condition which prevents the scanning of ballots.

Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1009751 - Unable to determine filesize for {1}	X		X		This message appears if the System is attempting to use (e.g. allot space for, save, write to, read from, etc.) a file of undetermined size. Note the actual name of the file appears in place of the "{1}".	Write down the error message and notify an appropriate election official. If this error occurred in response to an action taken on one of the DS850 screens (e.g. saving the Current Batch), attempt to repeat the action. If the problem persists, contact an ES&S Customer Service Representative for assistance.
1009752 - File missing	X		X		This message appears if the System is attempting to access a file that should exist but cannot be found. Note: If it is a UI file that cannot be accessed then no message is logged.	Write down the error message and notify an appropriate election official. If this error occurred in response to an action taken on one of the DS850 screens (e.g. saving the Current Batch), attempt to repeat the action. If the problem persists, contact an ES&S Customer Service Representative for assistance.
1009753 - Camera Calibration failed with error code {1}	X		X	x	This message appears when the process of calibrating the cameras fails. Note the actual calibration error code appears in place of the "{1}".	Write down the error message and notify an appropriate election official. Attempt to redo the Camera Calibration process from the 'Hardware' menu screen. If the problem persists, contact an ES&S Customer Service Representative for assistance.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
1018202 - ABNORMAL SHUTDOWN: Possible Interrupted Process	X	X	X		This message appears upon power-on start-up of the DS850 when the System detects that the previous shutdown was not a normal, user-controlled shutdown. Which means, something other than the user pressing the 'Shutdown' button happened when the previous shutdown occured.	Select 'OK' to acknowledge receipt of this message and to dismiss the screen. Then resume normal Scanner operations.
7001001 - Improper input parameter.	X				This is a programming error, which is not intended for the Scanner Operator.	This needs to be resolved by a skilled ES&S Programmer. This error should never occur on a Scanner in the field, at a customer's site. If you suspect that this error has occurred, contact an ES&S Customer Service Representative.
7001011 - Ballot image allocation failed.	X		X	X	This is error message appears when the System attempts, but fails to allocate (set aside) a portion of memory for processing ballot images. This type of error is more likely to happen upon startup-initialization, but it could happen at anytime. It forces a machine shutdown, which may or may not include a displayed shutdown screen.	If a shutdown screen does appear, write down the displayed error message before pressing the 'Shutdown' button. Notify an appropriate election official. Shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Customer Service Representative for assistance.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
7001015 - Memory allocation failed.	X		X		This is a generic error message that appears whenever the System attempts, but fails to allocate (set aside) a portion of memory to perform some operation. This type of error is more likely to happen upon startup-initialization, but it could happen at anytime. It forces a machine shutdown, which may or may not include a displayed shutdown screen.	If a shutdown screen does appear, write down the displayed error message before pressing the 'Shutdown' button. Notify an appropriate election official. Shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Customer Service Representative for assistance.
7001016 - Ballot ID party ID mismatch.			X		When a ballot is scanned, this error is logged if its ID does not match the expected Party ID.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as "unknown".
7001020 - Invalid choice ID.	X		X		When an invalid precinct ID is entered on the 'Select Precinct' screen and 'Search' is pressed, this error occurs. This displays an 'OK' error popup screen.	Select 'OK' to dismiss the popup. Leave the screen's entry field empty and press 'Search'. A multi-page list of all the valid precinct IDs is made accessible, so you can page to and then select the desired precinct from the list.
7001066 - Invalid scanned ballot id.			X		When a ballot is scanned, this error is logged if the ballot has an invalid ballot identification.	The Scanner should divert such a ballot to the Top Out-stack Bin, listing it as "ballot ID invalid".

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
7001165 - Ballot processing failed.	X		X		During the 'Export For Results' process, to run poll place collection and copy the results to a Target Media Device, if the System could not successfully complete ballot processing, then this message appears on an 'OK' error popup screen.	Select 'OK' to dismiss the popup. Try the same 'Export' process again. If the error recurs, write it down and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Customer Service Representative for assistance.
7003002 - Candidate data missing.			X		When a ballot is scanned, this error is logged if required candidate data is missing from the ballot.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as “unknown”.
7003003 - Contest data missing.			X		When a ballot is scanned, this error is logged if required contest data is missing from the ballot.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as “unknown”.
7003004 - Election data missing.			X		When a ballot is scanned, this error is logged if required election data is missing from the ballot.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as “unknown”.
7003005 - PollPlace data missing.			X		When a ballot is scanned, this error is logged if required pollplace data is missing from the ballot.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as “unknown”.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
7003006 - PRECINCT LABEL data missing.			X		When a ballot is scanned, this error is logged if required precinct label is missing from the ballot. **Note:** An actual name (e.g. Precinct, Borough, etc..) will appear in the place of "Precinct label.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as "unknown".
7003007 - Invalid PRECINCT ID.			X		When a ballot is scanned, this error is logged if the ballot has an invalid precinct identification. **Note:** An actual name (e.g. Precinct, Borough, etc..) will appear in the place of "Precinct label.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as "unknown".
7003008 - Ballot data missing.			X		When a ballot is scanned, this error is logged if required ballot data is missing from the ballot.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as "unknown".
7003009 - Invalid ballot ID.			X		When a ballot is scanned, this error is logged if the ballot has an invalid ballot identification.	The Scanner should divert such a ballot to the Top Out-stack Bin, listing it as "ballot ID invalid".
7003010 - Ballot style data missing.			X		When a ballot is scanned, this error is logged if required ballot style data is missing from the ballot.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as an "unknown".
7003012 - Ballot image data missing.	X		X		When the 'Export Files' process cannot locate expected ballot image data on the Scanner, this error occurs.	Select 'Export Files' again. If this error keeps recurring, contact an ES&S Customer Service Representative for assistance.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
7003013 - Business data missing.	X		X		When one of the export processes (e.g. 'Export Results'), selected from the 'Results' menu screen, cannot locate the related business data (e.g. eba.hdr file) for export, this error occurs.	Select the same export process again. If this error keeps recurring, contact an ES&S Customer Service Representative for assistance.
7003014 - Ballot data not loaded.	X		X		When loading an election from the 'Setup' screen, this error will occur if the related ballot data was not loaded as part of the Election Definition.	From the 'Setup' screen, clear and initialize the Scanner and then attempt to load the election again. If this error occurs again, a new ES&S Election Definition Media Device may be needed. Contact an ES&S Customer Service Representative for assistance.
7003017 - Could not store ballot.	X		X		When a ballot is scanned, this error occurs if the System could not store the ballot's data in memory. This stops ballot scanning and displays an error screen.	Write down the screens's error message and notify an appropriate election official. Follow the screen directions to clear the error. Go to the 'Results' menu screen, select 'Archive Data' and follow the on-screen information to export archive data to a selected Target Media Device. Once you have successfully archived the data, select 'Clear All Results' from the 'Results' menu screen. This should free-up enough memory space to allow the scanning and storing of ballot data to continue for quite some time.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
7003018 - Could not clear votes.	X		X		When either 'Clear All Results' or 'Clear A Precinct' is selected from the 'Results' screen, this error occurs if the system could not clear the vote data. This displays an 'OK' error popup screen.	Write down the popup's error message and notify an appropriate election official. Select 'OK' to dismiss the popup. Try the same 'Clear' operation again. If the error occurs again, contact an ES&S Customer Service Representative for assistance.
7003019 - Could not clear election.	X		X		When 'Clear and Initialize' is selected from the 'Setup' screen, this error occurs if the system could not clear the currently loaded Election Definition from the Scanner. This displays an 'OK' error popup screen.	Write down the popup's error message and notify an appropriate election official. Select 'OK' to dismiss the popup. Try the 'Clear and Initialize' operation again. If the error occurs again, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the error persists when you try 'Clear and Initialize' again, contact an ES&S Customer Service Representative for assistance.
7003025 - Could not open report file.	X		X		When a report is selected for preview or print from the 'Reports' screen, this error will occur if the System could not open the report file. This displays an 'OK' error popup screen.	Select 'OK' to dismiss the popup. Try to preview or print the report again. If the problem reoccurs, try to preview or print a different report. If the problem persists, contact an appropriate election official. You may need to contact an ES&S Customer Service Representative for assistance.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
7003039 - There was a problem accessing the ESS Memory Device. If the ESS Memory Device has been removed, please re-insert the ESS Memory Device and try again.	X		X		This error can occur for any function (e.g. 'Export For Results') requiring the insertion of an ES&S Memory Device (flash-drive / stick) into one of the Scanner's USB ports. The inserted device had been detected but it was then either removed or the System is just having trouble reading/writing to it. This displays a 'Cancel' error popup screen, with the same basic text as the error message above.	There are three options: 1). Reinsert the ES&S Memory Device; 2). Insert a different ES&S Memory Device; or 3) Select 'Cancel' to abort the function.
7003067 - Ballot layout data missing.			X		When a ballot is scanned, this error is logged if required ballot layout data is missing from the ballot.	The Scanner should divert such a ballot to the Top Out-stack Bin, identifying it as an "unknown".
7003068 - Could not create batch data.	X		X		When 'Save' is selected from a 'Scan Ballots' screen, to save the Current Batch of scanned ballots, if the System could not create the batch data, then this message appears on an 'OK' error popup screen.	Select 'OK' to dismiss the popup. Select 'Save' again, to save the batch. If the error recurs, write it down and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Customer Service Representative for assistance.

System Messages

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Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
7003069 - Could not create resolve manifest data.	X		X		During the 'Export Files' process, to copy the scanned ballot images to a Target Media Device, if the System could not create the manifest data for the ballot images, then this message appears on an 'OK' error popup screen.	Select 'OK' to dismiss the popup. Try the same 'Export' process again. If the error recurs, write it down and notify an appropriate election official. If possible, shutdown and then turn off the Scanner. Wait 30 seconds and then turn the Scanner back on. If the problem persists, contact an ES&S Customer Service Representative for assistance.
7101004 - Clear operation requested using improper ESS Memory Device.	X		X		This error occurs if the Operator attempts to 'Clear and Initialize' the Scanner using an ES&S Media Device other than the required, valid ES&S EQC Media Device.	Replace the inserted ES&S Media Device with a valid ES&S EQC Media Device. Allow the Scanner to detect the inserted replacement device (as indicated by a temporary popup screen), then attempt the 'Clear and Initialize' process again. If you do not have a valid ES&S EQC Media Device, contact an appropriate Election Official. They in turn may need to contact an ES&S Customer Service Representative for assistance.

System Messages

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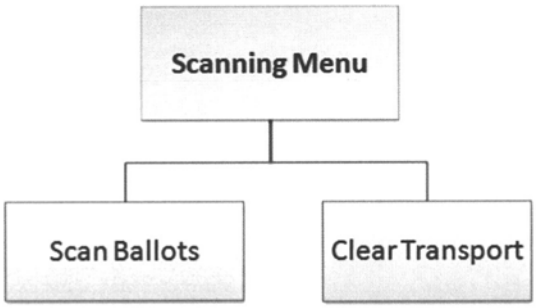
Message Text	Message Displayed	Message Printed	Message Logged	Results in a System Halt	Cause	Resolution
7101012 - EQC data invalid or missing.	X		X		This error occurs if the Operator attempts to 'Clear and Initialize' the Scanner using an ES&S EQC Media Device, that is either missing data or contains invalid data.	Replace the inserted ES&S EQC Media Device with a valid ES&S EQC Media Device. Allow the Scanner to detect the inserted replacement device (as indicated by a temporary popup screen), then attempt the 'Clear and Initialize' process again. If you do not have a valid ES&S EQC Media Device, contact an appropriate Election Official. They in turn may need to contact an ES&S Customer Service Representative for assistance.
7101013 - Authentication data invalid or missing.	X		X		This error occurs if the Scanner Operator attempts to either 'Clear and Initialize' or 'Load Election' using an ES&S Media Device, that is either missing authentication data or contains invalid authentication data.	Replace the inserted ES&S Media Device with the proper, valid ES&S Media Device. Allow the Scanner to detect the inserted replacement device (as indicated by a temporary popup screen), then attempt the 'Clear and Initialize' or 'Load Election' process again. If you do not have the proper, valid ES&S Media Device for the desired process, contact an appropriate Election Official. They in turn may need to contact an ES&S Customer Service Representative for assistance.

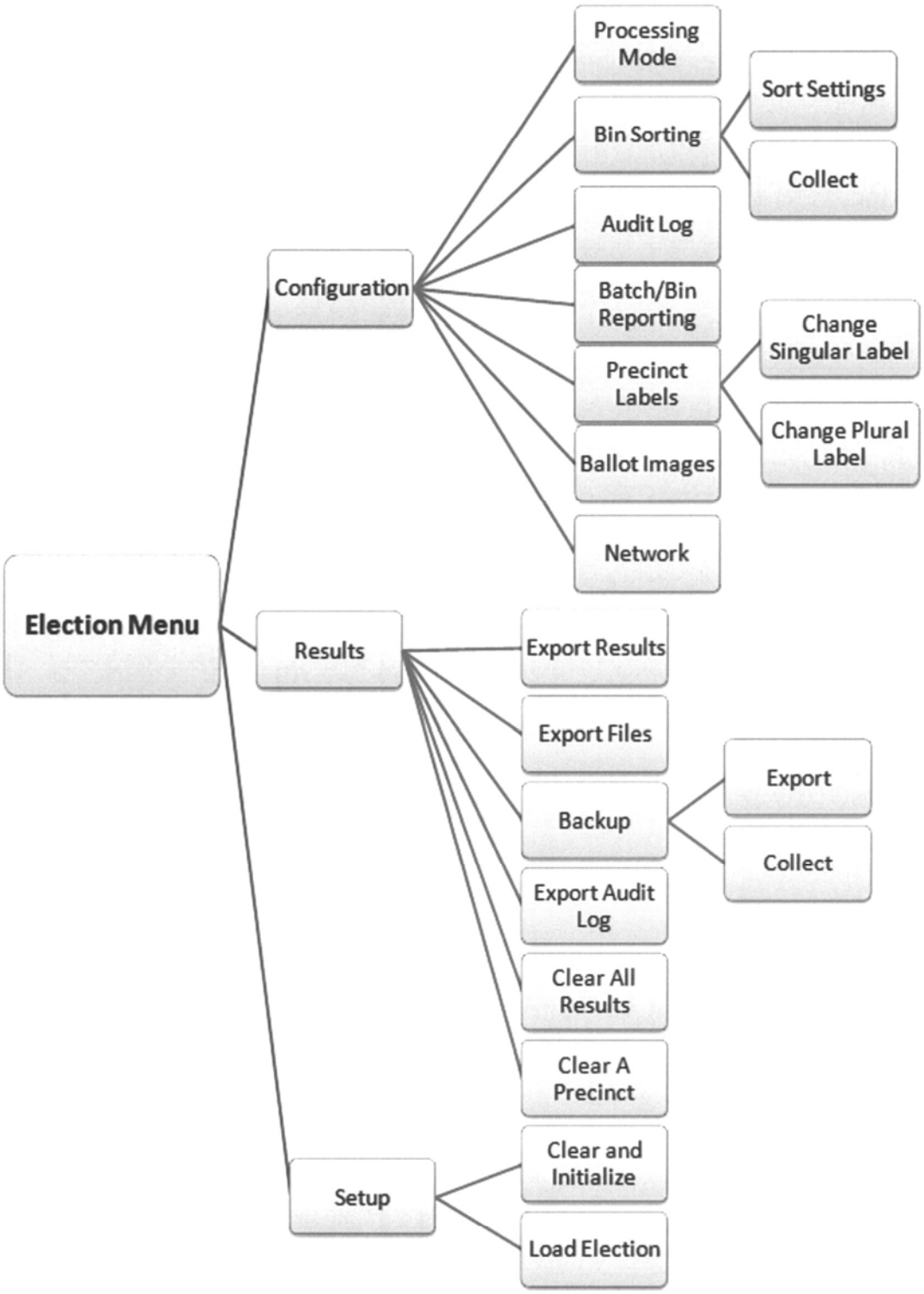
Chapter 11: Menu Structure

This chapter contains illustrations showing the Scanning, Election, Reports, System, and Hardware menus and the screens that can be accessed from each of those menus. The boxes for screens that are not currently available are shaded.

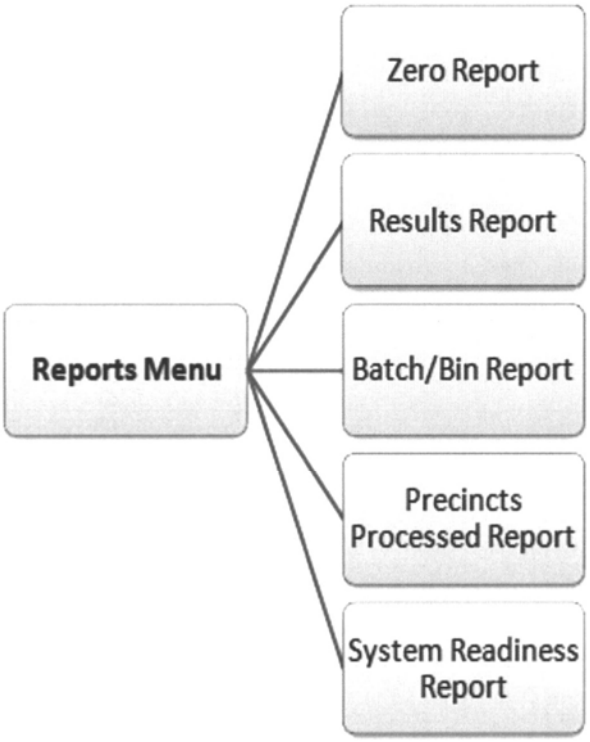
Scanning Menu



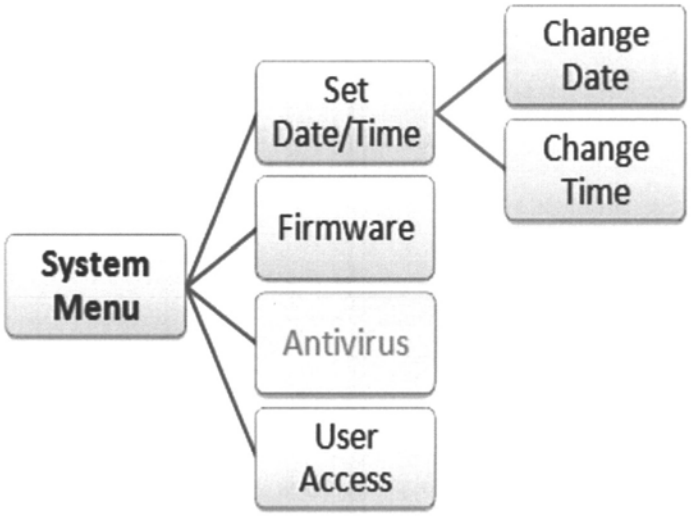
Election menu



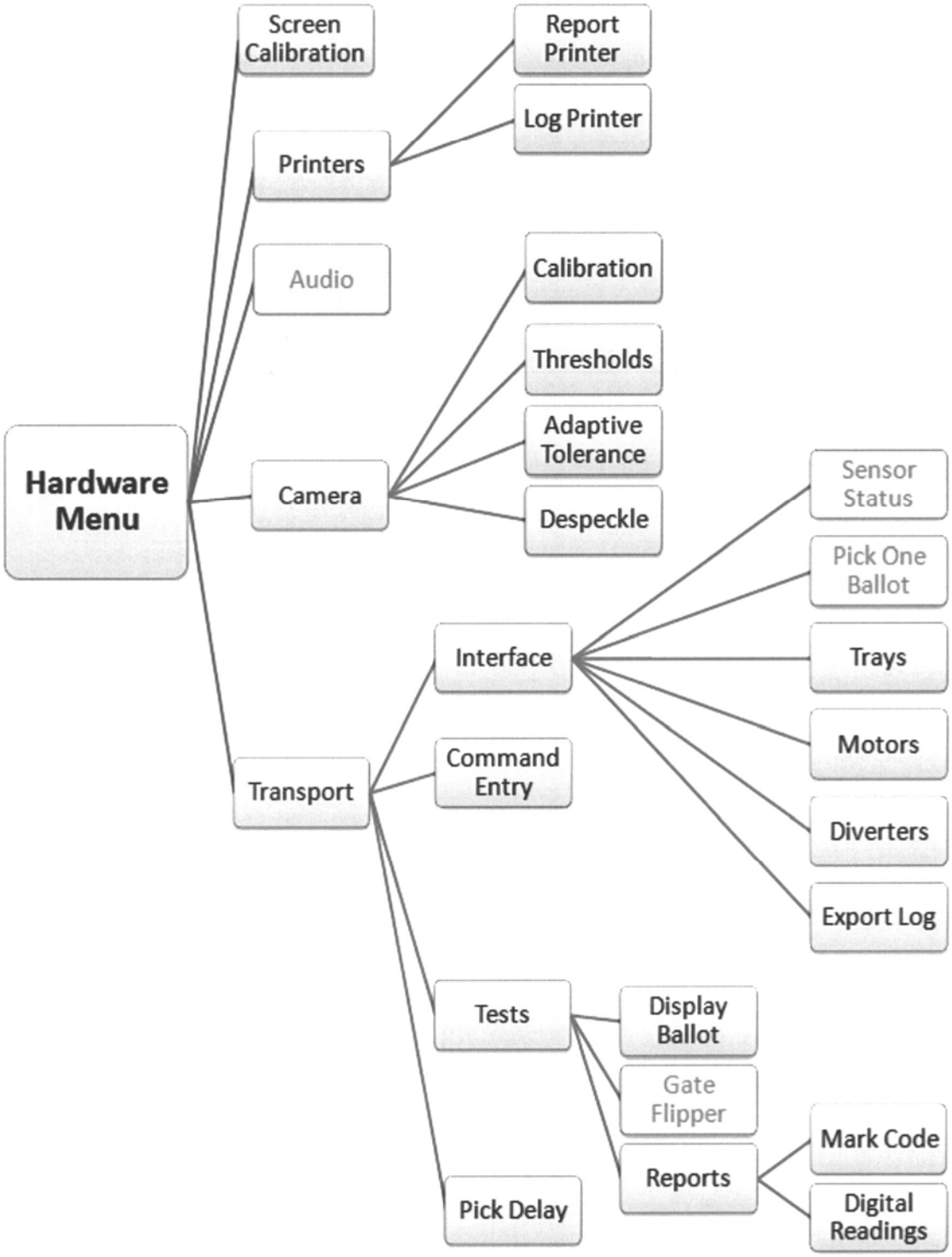
Reports menu

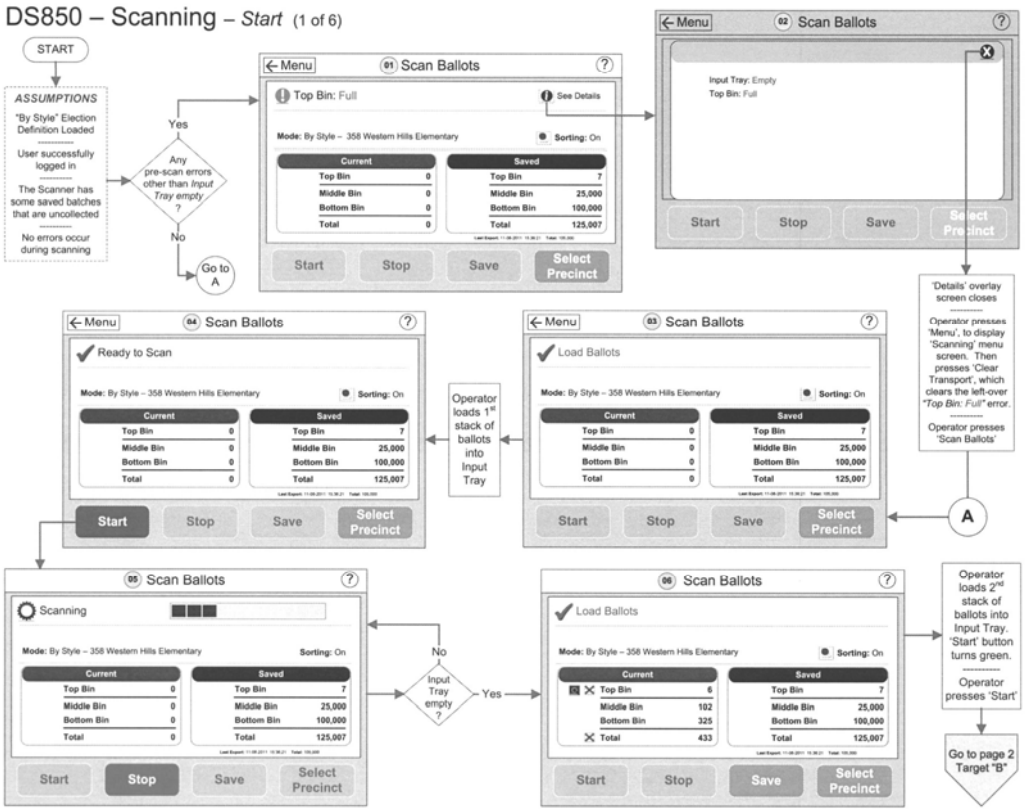


System menu

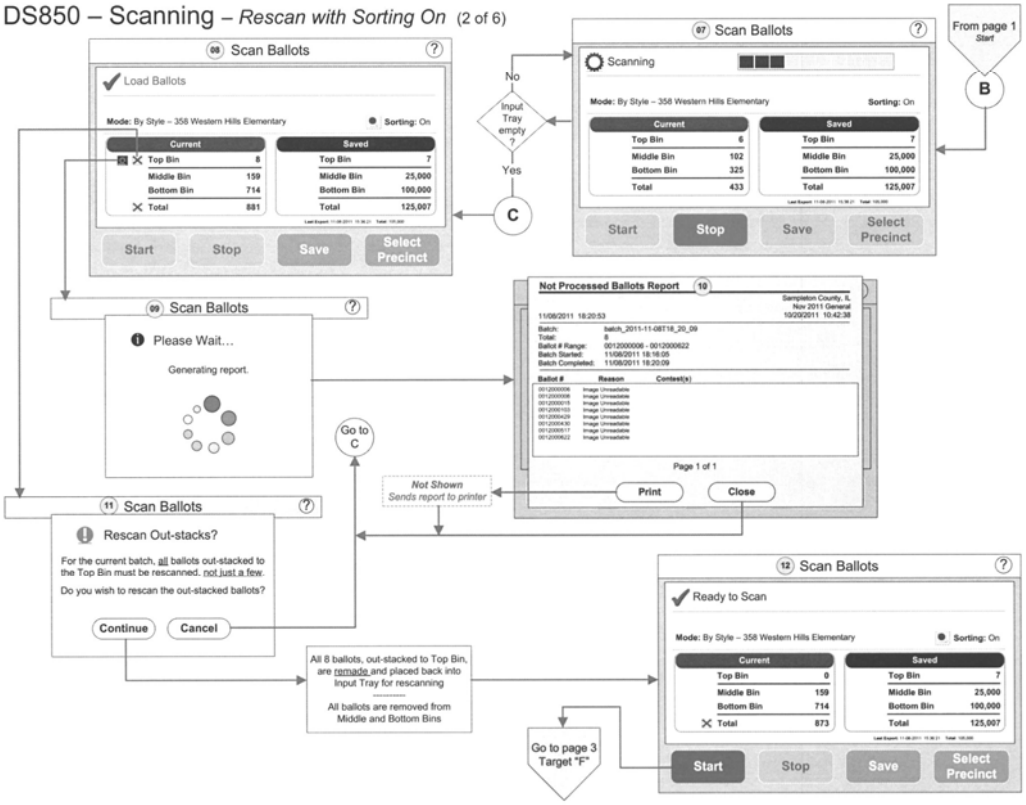

System Menu
Set Date/Time
Firmware
Antivirus
User Access
Change Date
Change Time

Hardware menu

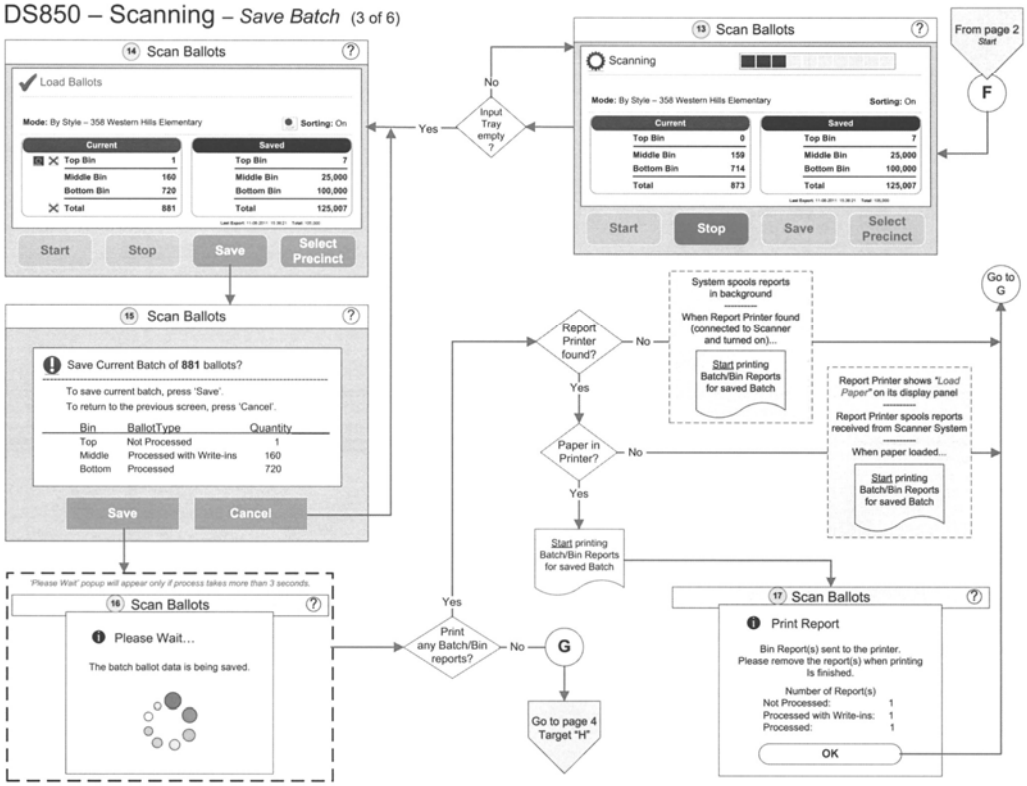



DS850 – Scanning – Start (1 of 6)
START
ASSUMPTIONS
"By Style" Election Definition Loaded
User successfully logged in
The Scanner has some saved batches that are uncollected
No errors occur during scanning
Any pre-scan errors other than Input Tray empty ?
Yes
No
Go to A
Menu
01 Scan Ballots
Top Bin: Full
See Details
Mode: By Style – 358 Western Hills Elementary
Sorting: On
Current
Saved
Start
Stop
Save
Select Precinct
02 Scan Ballots
Input Tray: Empty
Top Bin: Full
'Details' overlay screen closes
Operator presses 'Menu', to display 'Scanning' menu screen. Then presses 'Clear Transport', which clears the left-over "Top Bin: Full" error.
Operator presses 'Scan Ballots'
A
03 Scan Ballots
Load Ballots
Operator loads 1st stack of ballots into Input Tray
04 Scan Ballots
Ready to Scan
05 Scan Ballots
Scanning
Input Tray empty ?
No
Yes
06 Scan Ballots
Load Ballots
Operator loads 2nd stack of ballots into Input Tray. 'Start' button turns green.
Operator presses 'Start'
Go to page 2 Target "B"

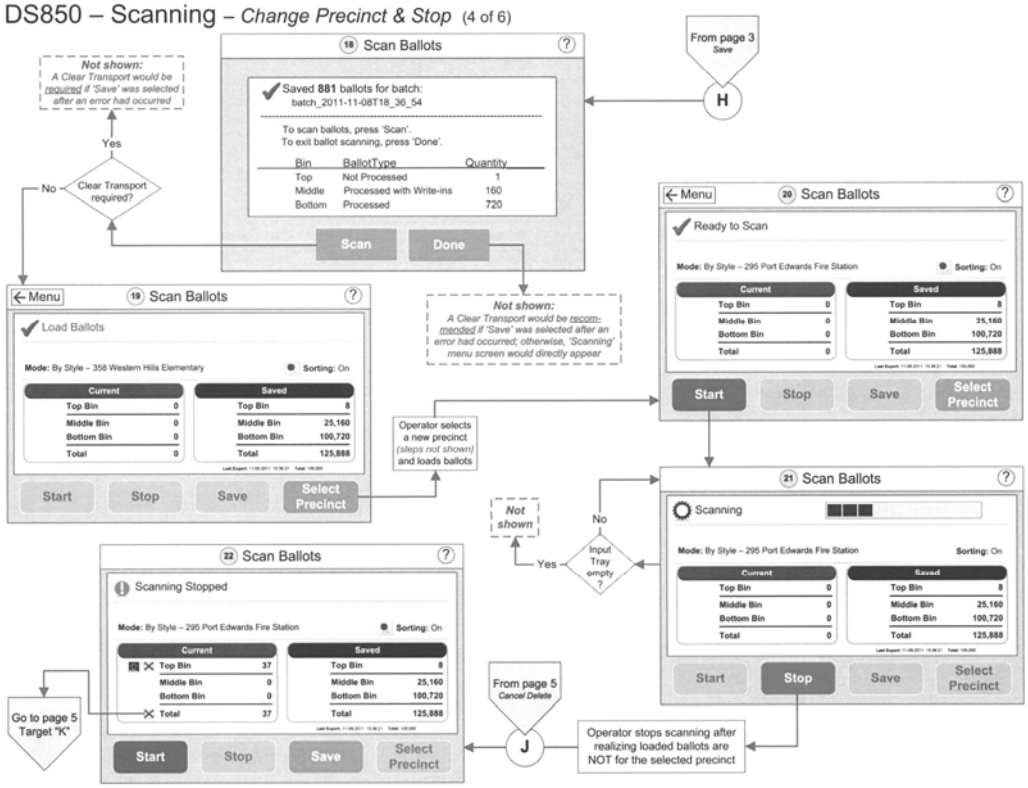
DS850 – Scanning – *Rescan with Sorting On* (2 of 6)



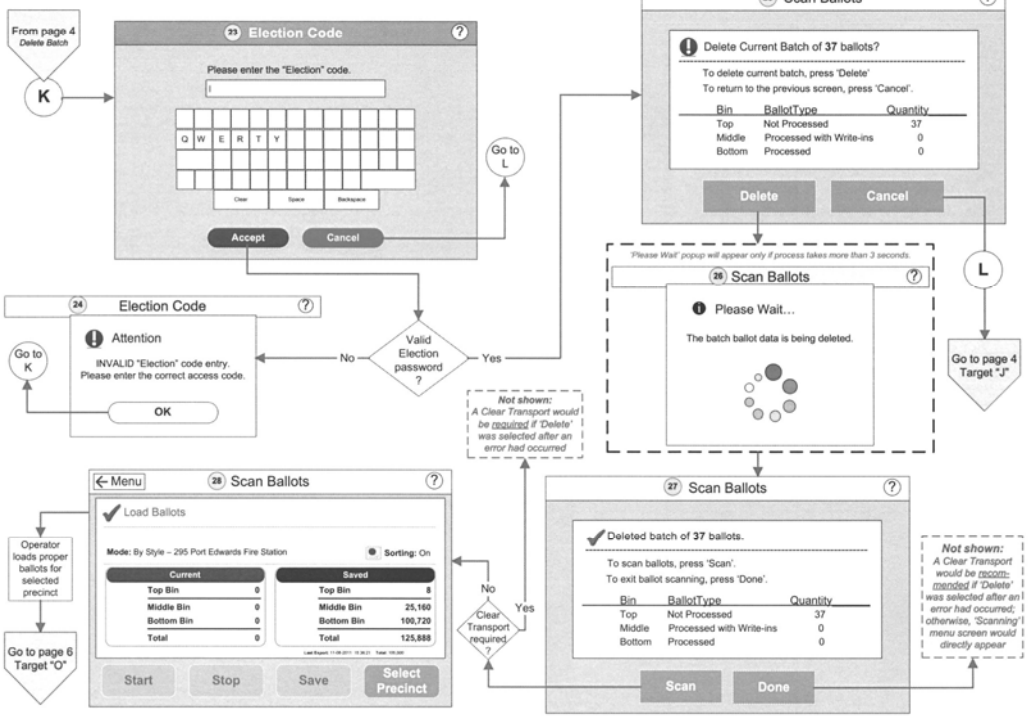
DS850 – Scanning – *Save Batch* (3 of 6)



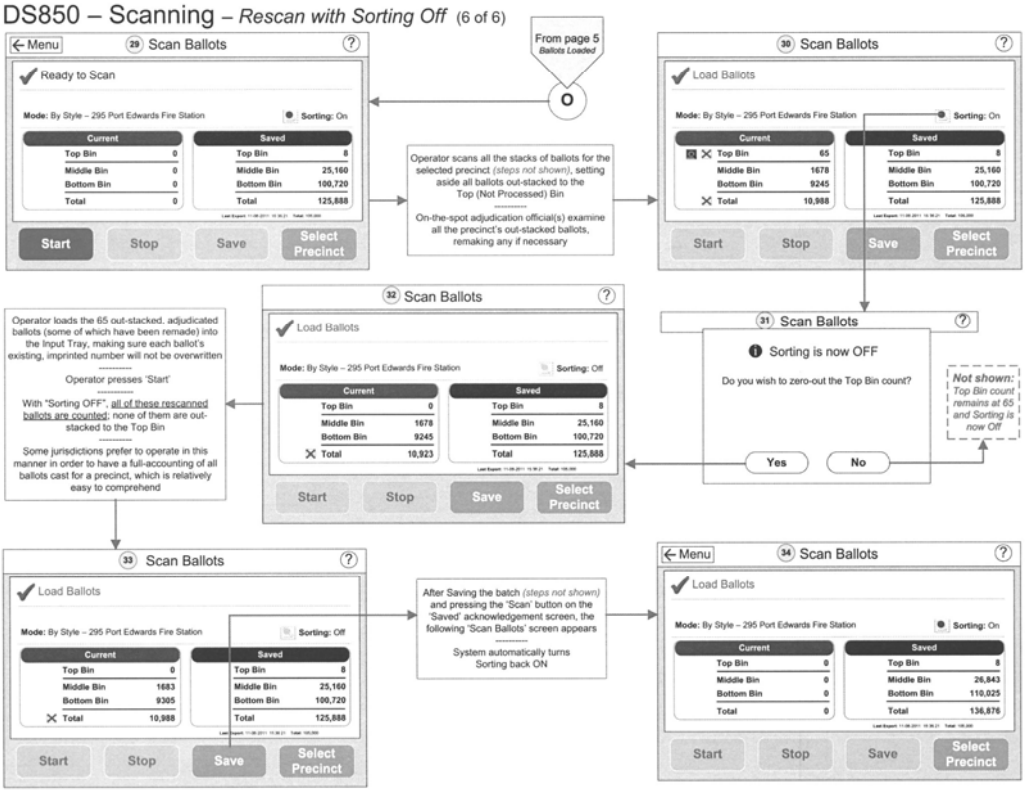
DS850 – Scanning – *Change Precinct & Stop* (4 of 6)



DS850 – Scanning – *Delete Batch* (5 of 6)



DS850 – Scanning – *Rescan with Sorting Off* (6 of 6)



Chapter 12: Troubleshooting

This chapter provides instructions for the steps to take for some common issues that may occur with the DS850. If these issues persist after you have attempted the troubleshooting steps, please contact your ES&S representative.

The following issues are covered in this section:

- Abnormal Scan Termination
- Loss of Power To the Facility

Abnormal Scan Termination

If an abnormal scan termination occurs, the scanner will use a predefined set of criteria to determine the scan error type. After the scanner determines the scan error type, it will display instructions for correcting the error. Carefully follow the displayed instructions.

Loss of Power To the Facility

In the event that the power to the facility is lost, the UPS will repeat a series of 4 beeps and will provide battery power long enough for you to finish scanning the current batch of ballots, save or delete the batch, and perform a controlled shutdown. If you do not shut down the system, and the UPS reaches a critically low battery level, the DS850 will initiate a controlled shutdown to prevent the system from being corrupted by an uncontrolled shutdown. When this occurs, all unsaved ballot data will be lost, and the ballots will need to be re-scanned. Scanning is not allowed while on battery power, but all other functions are available. When power to the facility is restored, scanning can resume normally.

Chapter 13: Revision History

DS850 System Operations Procedures v2.4
Document Version 11.1
January 30, 2013

Chapter	Description	Project
Chapter 1: DS850 Overview	Added note to Election Definitionsection	

DS850 System Operations Procedures v2.4
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January 24, 2013

Chapter	Description	Project
Chapter 5: Pre-Election Day Tasks	Updated Audit Log section, removed 'All' from introduction sentence.	

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Chapter	Description	Project
Chapter 6: Election Day Tasks	Updated Out-Stacked Ballots with a Note	

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Document Version 8.1
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Chapter	Description	Project
All	Internal review with general updates for usability	

DS850 System Operations Procedures v2.4
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June 8, 2012

Chapter	Description	Project
All	General updates for usability	
Chapter 11: Menu Structure	Added new menu diagrams.	

DS850 System Operations Procedures v2.4
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May 25, 2012

Chapter	Description	Project
All	General updates for usability	

DS850 System Operations Procedures v2.4
Document Version 6.0
April 17, 2012

Chapter	Description	Project
All	Removed references to HPM/EDM and replaced with ElectionWare references, and made general updates throughout for usability.	
Chapter 11: Menu Structure	Updated diagrams to landscape pages, to show full menu structure.	

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March 28, 2012

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DS850 System Operations Procedures v2.4
Document Version 3.0
February 14, 2012

Chapter	Description	Project
Chapter 5: Pre-Election Day Tasks	Updated the following sections: • Precinct Labels • Ballot Images	
Chapter 6: Election Day Tasks	Updated the following sections: • Export Results • Export Files • Backup • Special Instructions for Processing Folded Ballots	

DS850 System Operations Procedures v2.4
Document Version 2.0
December 15, 2011

Chapter	Description	Project
All	General updates for usability	

DS850 System Operations Procedures v2.4
Document Version 1.0
November 15, 2011

Chapter	Description	Project
	Initial Document	

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Election Systems and Software, LLC
Corporate Headquarters
11208 John Galt Blvd.
Omaha, Nebraska 68137
United States of America
Phone: (402) 593-0101
Toll Free Inside of U.S.: (877) 377-8683
Fax: (402) 967-1267
http://www.essvote.com
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Proprietary Document Section	Description
N/A	N/A

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Part 1: AutoMARK SOP

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- Chapter 2: Steps to Prepare for the Election
- Chapter 3: Introduction to the AutoMARK
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- Chapter 13: Security Measures

Chapter 1: Overview

Note: The following types of tabulators work with the AutoMARK.

- ES&S DS200
- ES&S DS850

Operating Functions

The AutoMARK™ Voter Assist Terminal (VAT) offers the following functions:

- Marks voter selections on a standard ballot form in a human-readable format
- Provides Braille keypad and display shut-off to maintain privacy for voters who are visual impaired
- Provides audio and visual instructions in multiple languages
- Processes multiple ballot types and sizes
- Provides secure environment via a Flash Memory Card protected in a locked compartment

Operating Modes

The VAT has three operating modes. Modes are selected via a key lock on the front of the terminal. The three operating modes are as follows:

- **Off.** The system must be in Off mode prior to unplugging the unit from power and packing for shipping.
- **On.** Select On for selection functions. Voters use the system in this mode.
- **Test.** The Test mode is used for verification testing prior to use in a polling place or to verify system updates.

Roles

Election officials prepare the ballots and the election database to be used by the VAT.

Election officials and/or polling place staff unpack and install the system, conduct the verification test to determine the operational integrity, and are responsible for system shut down, maintenance, and packing. At the polling place, election officials setup the system hardware and perform the following operations:

- System Installation and Test
- System Startup/Shutdown
- Database Installation

Polling place staff (Poll Workers) also assist voters with gaining familiarity with the system, clearing paper jams, etc.

Voters use the AutoMARK to mark their ballots.

Jurisdictional Nomenclature

Terminology for the lowest-level common geopolitical civil division differs by state and country. In this manual and other ES&S documentation, the entity is referred to as a precinct.

As a company with accounts across the country and around the world, ES&S recognizes that certain jurisdictions use terms other than precinct. Some examples of the terms used by other jurisdictions are Election District (or ED), Borough, Province, Division, and District. These terms and others may be substituted for precinct depending upon the particular jurisdiction. However, for consistency, ES&S uses the term precinct throughout its documentation.

Chapter 2: Steps to Prepare for the Election

This document guides the Election Official in preparing the VAT for use in an election.

The following steps must occur so the VAT preparation is completed and verified well before the election day.

Note: Suggested deadlines may vary by state.

Steps to Prepare for the Election

Step	Action Required	Suggested Due Date	Reference and Supporting Document
1	Prepare the election data files.	At least six to eight weeks before election	See the *ES&S ElectionWare System Operations Procedures* or the *ES&S Election Data Manager System Operations Procedures* manuals
2	Import the data files created in Step 1 into ElectionWare	At least six to eight weeks before election	See the *ES&S ElectionWare System Operations Procedures* manual
3	Create paper ballots from imported data files in the Paper Ballot module of ElectionWare	At least six to eight weeks before election	See the *ES&S ElectionWare System Operations Procedures* manual
3	Test that the ballots are set up correctly and that the data was generated correctly by using the VAT Preview function in ElectionWare	At least five to seven weeks before election	See the *ES&S ElectionWare System Operations Procedures* manual
4	Print Paper Ballots through ES&S, or an ES&S partner printer.	At least five to seven weeks before election	See the *ES&S ElectionWare System Operations Procedures* manual
5	Generate AutoMARK and tabulator data using ElectionWare	At least four to six weeks before election	See the *ES&S ElectionWare System Operations Procedures* manual
6	Create Flash Memory Card(s)	At least three weeks before election	See the *ES&S ElectionWare System Operations Procedures* manual
7	Prepare VAT for use	At least two weeks before election	See Chapter 5: AutoMARK Setup Instructions in this document.

Steps to Prepare for the Election *(continued)*

Step	Action Required	Suggested Due Date	Reference and Supporting Document
8	Using new Flash Memory Card(s) and ballots, print test ballot(s) on VAT to verify that the data is correct.	At least two weeks before election	See Chapter 11: Maintenance in this document.
9	Install VAT at polling place before polls open	At least the morning of the election	See Chapter 5: AutoMARK Setup Instructions in this document

Chapter 3: Introduction to the AutoMARK

The AutoMARK is used to mark the ballot selections of voters who are visually impaired, have a disability, or who are more comfortable using an alternative language.

Ballot choices and instructions are displayed in large text print on the touch screen monitor, as well as read by the audio system in the language choice selected by the voter. Voters enter their selections by touching buttons on the screen, pressing keys on the keypad, or using an Assistive Technology (AT) device.

The AutoMARK marks a ballot with the voter's selections and returns it to the voter. The voter can then submit the marked ballot in the normal manner for tabulation. This guide contains information on how to set up the AutoMARK prior to an election and how to maintain the AutoMARK between elections.

Features of the AutoMARK

A voter can use the AutoMARK to mark a ballot by using:

- The touch screen
- The Braille keypad
- An AT device (such as puff-sip or foot pedal)

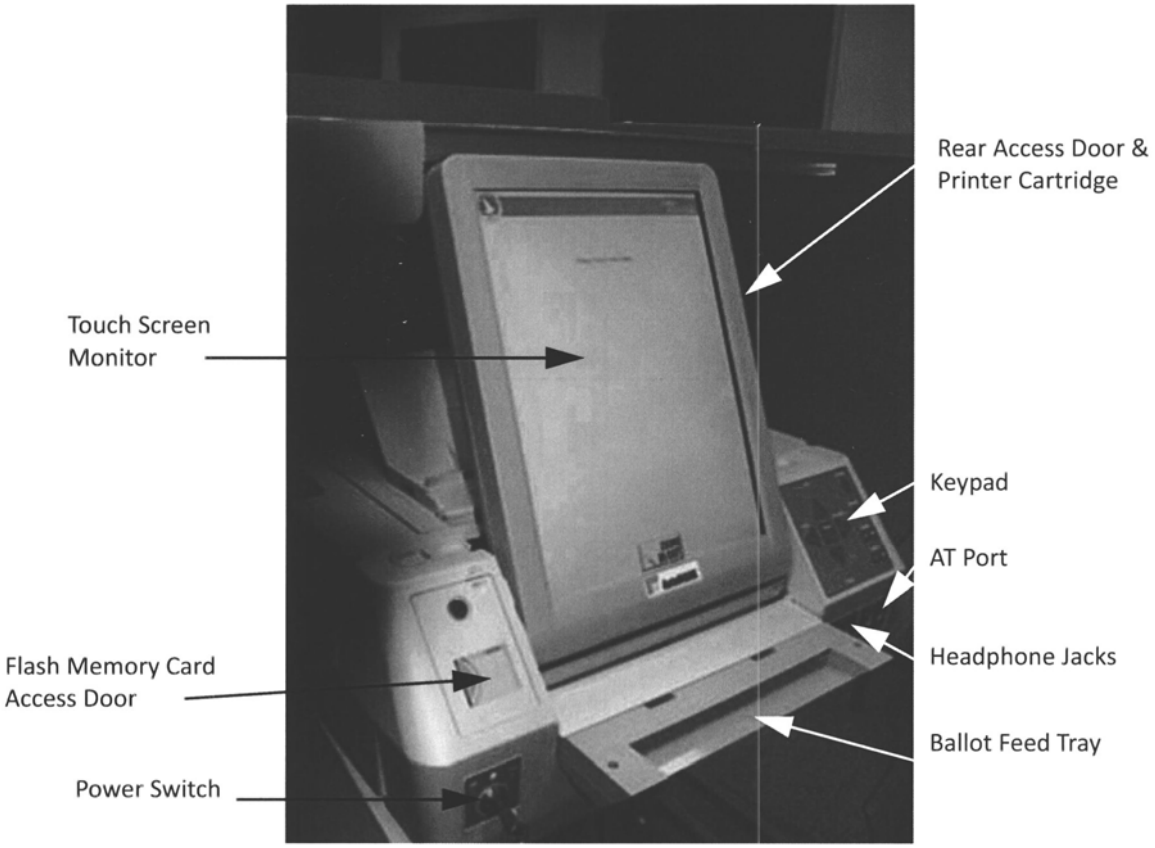
The AutoMARK has the capability to display ballots in alternate languages. Language choices are determined by individual jurisdictions. If the jurisdiction does not choose to allow alternate languages, the voter will not see the Language Screen, and the only Language available will be English. The audio matches the language selected.

The AutoMARK has several privacy features. Audio volume can be increased or decreased as desired, and the screen can be turned on and off for privacy. If you want to use the audio system to listen to ballot choices and instructions, you will use the audio keys on the keypad (shown on the following page) to control audio sound. A jurisdiction can provide headphones with disposable earpieces.

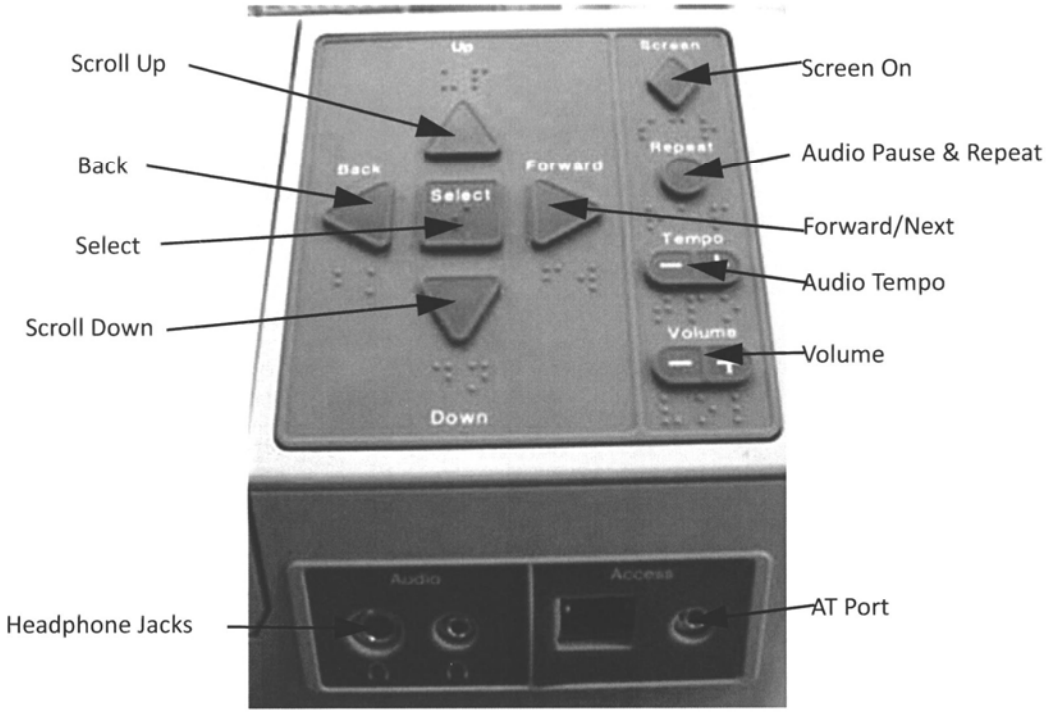
The AutoMARK also has a **ZOOM MODE** feature which enlarges the text on the screen, and a **High Contrast** mode which gives contrast to the screen resolution, for those who are visually impaired.

The AutoMARK has an AutoCAST option that can be turned on that allows ejection of the voted ballot to a temporary container to be tabulated at a later time. When this option is turned on, a second summary of the ballot is presented to the voter after the ballot has been printed. The option to eject out the front of the unit directly to the voter is still available.

The AutoMARK consists of the components shown in the following labeled picture.



Keypad and Access Ports



Using the Audio Pause and Repeat feature:

- **To pause (for 3.5 seconds) and repeat the current spoken label:** Briefly press the Repeat button.
- **To pause audio:** Hold down the Repeat button for 3 seconds.
- **To resume audio:** Briefly press the Repeat button.

AutoMARK Keys and Buttons

The AutoMARK is designed so that you can use either the keys on the keypad, an AT device, or touch displayed text and buttons on the screen to enter your selections.

When you press the keys on the keypad or touch text or buttons on the screen, you are actually sending operating instructions (commands) to the computer. (For example, pressing the Screen Off/On key on the keypad tells the computer to turn the touch screen monitor off or on.)

Touch screen buttons in the following picture appear at the bottom of a screen.

Note: The buttons shown in the illustration do not appear on every screen.

Sample of Touch Screen Buttons

- Touching the **BACK** button displays the previous screen.
- Touching the **ZOOM In/Out** button on any screen increases and decreases the size of the text displayed.
- Touching the **EXIT RETURN BALLOT** button displays the EXIT screen.
- Touching the **HIGH CONTRAST** button on any screen lightens or darkens the screen contrast.
- Touching the **NEXT** button enters your selection and displays the next screen.

If you want to listen to choices and instructions in the language of your choice and use the keys on the keypad to enter your selections, plug in your headphones, or use the headphones provided by the jurisdiction.

Note: Audio includes keypad instructions. Therefore, no further audio and keypad information is included in this guide.

Using an AT Input Device

The AutoMARK provides an interface for an input device for disabled voters to indicate their selections. This device is often called an AT device, Assistive Technology device, which requires that access be provided to citizens with disabilities.

The AT input device allows the voter to make his or her selections, in place of either the touch screen, or the keypad on the AutoMARK unit.

AT input devices supported include a sip and puff device, a paddle switch, a floor switch, or any similar two-position switching device that is comfortable for the voter and meets the electrical specifications below. The voter may choose to bring his or her device to the polling place. The polling place should have AT devices on hand for voters with disabilities to use.

Verify: Contact your sales representative for information about how to obtain assistive technology devices.

The AutoMARK supports a type of electrical interface standard called DSA, dual-switch access. The AT input device plugs into the 3.5 mm "stereo" jack in the right section of the ACCESS area on the front panel of the AutoMARK.

Within the input device there are two momentary switches. These switches are connected to a cable terminated with a 3.5 mm stereo plug. One switch connects to the TIP connection on the stereo plug, and the other switch connects to the RING pin on the stereo plug. Each switch is normally open. When actuated by the user, the switch closes either the TIP or the RING circuit to the common BARREL shaft of the stereo plug.

Electrical specifications for the two switches within the AT input device: switch contact resistance when a switch is closed, less than 100 ohms. DC current handling capability, 5 milliamperes. These specifications are readily met by DSA devices in the market that have been tested by ES&S.

Circuitry within the AutoMARK detects when an AT input device has been inserted into the jack, and activates a special interface mode. The sequences of choices on the LCD screen in AT input mode are adapted to accept either of two responses, YES and NO, or UP and DOWN, or LEFT and RIGHT, as may be suitable in context for the selections being made. Likewise, the audio prompts that are available at the headphone outputs are also adapted for this two-switch interface mode.

Note: An AT input device does not provide access to the following functionality.

- Adjusting the volume of the audio.
- Adjusting the tempo of the audio.
- Repeating the audio of the screen.
- Turning the display screen on and off.

Be aware that it can take up to 6 seconds for the AT device to be recognized by the VAT when it is plugged in.

Start Up Procedure

Take the following steps to start the AutoMARK.

1. Open the AutoMARK unit and position the display.
2. Locate the audio headphone jack on the front lower-right panel (below the keypad) and plug in the headphones.
3. Plug the power cord into a power connection in the back of the unit and the other end of the cord into a nearby AC power source. Make sure the cord is not in a position where it would be hazardous to anyone walking nearby.
4. Turn the security key located in the front of the unit to the ON position and remove the key before voters are allowed to use the AutoMARK.

Note: The AutoMARK uses a Power On Self Test (POST) to verify all internal functionality. If during the POST the system experiences a failure, the AutoMARK will display an error message detailing the issue on the screen.

Shut Down Procedure

To shut down the unit when the polls are closed, insert the security key located in the front of the unit and turn it to the OFF position, to turn off the electrical power.

Chapter 4: Safety Information

Read the safety information, precautions and procedures in this section carefully before attempting to operate the AutoMARK Voter Assist Terminal.

Industry Regulatory Requirements

The AutoMARK Voter Assist Terminal has been designed to comply with the industry regulatory requirements set forth in IEEE and Election Assistance Commission, (EAC) Voluntary Voting System Guidelines (VSSG), 2005.

The Voter Assist Terminal complies with the basic product safety standard

UL 60950-1: First Edition: Standard for Safety of Information Technology Equipment.

Lockout

The AutoMARK has a key-activated switch that is located on the front panel of the enclosure. The key-activated switch is used to control the system's operating mode. Key switch positions are described as follows:

Key Position	Label	Key Removable
Right	TEST	No
Center	ON	Yes
Left	OFF	Yes

Note: Special security keys are provided to access and activate this switch. These keys are to be used by authorized election officials only.

When the key-activated switch is in the TEST or ON positions, the AutoMARK is switched on and power is drawn from the AC power line (if available) or the battery (if AC power is unavailable).

When the key-activated switch is in the TEST position, the AutoMARK enters a Test Mode, which allows the election official to perform system setup, reporting, testing and maintenance functions.

When the key-activated switch is moved to the ON position, the AutoMARK is ready for normal operations.

When the system is powered up and the key-activated switch is moved to the OFF position, AC power continues to be supplied to the AutoMARK. However, current is only drawn for recharging the battery while the key switch is in the OFF position. The terminal is shut down only when the key switch is in the OFF position.

Hazard Labels

Industry standard danger, warning, and caution labels are affixed to all hardware components that may cause hazardous results if accessed incorrectly.

Symbols Used on the Equipment

⚠	This symbol instructs the Operator/User to consult the accompanying instructions before operating the equipment
⏚	"PROTECTIVE EARTH". This symbol is adjacent to the internal Protective Earth terminal

Weight Distribution

Attribute	Spec	Units
Overall Width	20.8	Inches
Overall Depth	26.0	Inches
Overall Height	17.6	Inches
Height, display stowed	7.5	Inches
Overall weight, including batteries	48	Pounds

System Power

The AutoMARK contains a built-in power supply that operates from standard AC line voltages. It also includes batteries with sufficient capacity to allow the unit to continue to operate for at least 2 hours after loss of AC power. Specifications are listed in the following table.

Attribute	Spec	Units
Input Power Voltage	93-264	VAC
Input Power Frequency	45-66	Hz
Battery Hold-Up, Minimum	2	Hours

The AutoMARK has a pilot light and battery monitor (bi-color LED) lamp on the front panel that indicates the current status of the power supply. Specifications are described below.

LED Attribute	Power Source	Battery Status
Steady Green	AC Power	Batteries Charged
Blinking Green	AC Power	Batteries Low or Discharged
Steady Yellow	Battery Power	Batteries Charged
Blinking Yellow	Battery Power	Batteries Low
Steady Red	AC Power/key switch off	

Since there is no power switch for the AC Mains Supply, the Disconnect Means for the equipment is the plug on the power supply cord-set (or the Appliance Inlet connector on the rear of the unit)

The Mains socket-outlet shall be installed near the equipment and be readily accessible.

To remove all power from the equipment, both the AC Mains Plug and the DC Plug of the external Charger must be disconnected from the equipment.

Complete Mains electrical rating: 120V~ 60Hz 1.5A.

Mains supply voltage fluctuations are not to exceed +10% percent of the rated supply voltage range.

The equipment is suitable for continuous operation. The AutoMARK will handle eight ballots per hour (one ballot every 7.5 minutes), with the spit and wipe feature deactivated, when it is operating on battery power.

Battery Replacement

The Lithium-Ion Battery Pack (and the 3V lithium coin cell battery in the Single Board Computer) is replaceable only by Authorized Service Personnel.

Caution: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to local regulations and conventions.

Environmental Conditions for Transport and Storage

The AutoMARK is intended for indoor use only.

The AutoMARK is designed for the following environmental conditions:

Conditions	Minimum	Maximum	Units
Operation	50	104	oF
	10%	50%	Relative Humidity
Storage	-4	140	oF
	10%	85%	Relative Humidity
Transport	14	140	oF
	10%	85%	Relative Humidity

A shipping container is available for the AutoMARK. It provides sufficient padding and protection to permit long-distance shipment of the unit via common carrier.

Additional Safety Instructions and Required Specifications

- Indoor Use Only
- Ordinary Protection (Not protected against harmful ingress of moisture)
- Class I Equipment (Grounded Type)
- Electrical rating: 120V~ 60Hz 1.5A
- Mains supply voltage fluctuations are not to exceed +10% percent of the rated supply voltage range.
- Pollution Degree 2 for the ambient environment
- Installation (Over-voltage) Category II for transient over-voltages

Chapter 5: AutoMARK Setup Instructions

This chapter provides instructions on how to prepare for Election Day.

The following procedures must always be performed *before* each election:

1. Set Up the AutoMARK Table (if available)
2. Install a New Printer Cartridge
3. Charge the Battery (If Installed)
4. AutoCAST Ballot Box
5. Open the LCD for Use to ensure full functionality of the system.

The instructions for performing the procedures are described in the rest of this chapter.

Facilities, Furnishings, Fixtures, and Utilities

The AutoMARK is a portable ballot marking device, designed to be placed onto a standard table while in use during voting operations. It is the responsibility of the Jurisdictional Official to use a table of standard height with the VAT placed at the front edge on the table so that the AutoMARK is accessible to voters with disabilities, allowing it to meet the VSSG standards for accessibility.

When placed appropriately on a standard table, the AutoMARK meets the following standards to make the voting process accessible to voter who use mobility aids, including wheelchairs:

- Provide clear floor space of 30 inches (760 mm) minimum by 48 inches (1220 mm) minimum.
- Where clear floor space only allows forward approach to an object, the maximum high forward reach shall be 48 inches. The minimum low forward reach shall be 15 inches.
- Where forward reach over an obstruction with knee space below, the maximum level forward reach is 25 inches. When the obstruction is less than 20 inches deep, the maximum high forward reach is 48 inches. When the obstruction projects 20 to 25 inches, the maximum high forward reach is 44 inches.
- The position of any operable control is determined with respect to a vertical plane that is 48 inches in length, centered on the operational control, and at the maximum protrusion of the product within the 48-inch length.
- Where any operational control is 10 inches or less behind the reference plane, have a height that is between 15" and 54" above the floor.

- Where any operational control is more than 10 inches and not more than 24 inches behind the reference plane, have a height between 15 inches and 46 inches above the floor.
- Have operational controls that are not more than 24 inches behind the reference plane.
- At the jurisdictional preparation facility, the AutoMARK should be placed on top of a table to prepare it for the polling place.
- A standard 100V outlet must exist in the facility for power cord plug in. The AutoMARK's input rating is 120V~ 60Hz 1.5A. The main supply voltage fluctuations are not to exceed plus or minus 10 percent of the rated supply voltage area. It is recommended that the unit is plugged directly into a power supply without the use of an extension cord.
- The AutoMARK is intended for indoor use only.
- Operational humidity during operations should be between 10 - 50 percent RH.

Warning: Do not place containers with liquids such as coffee, water or soda on or near the AutoMARK. Do not operate the scanner in an excessively wet environment.

- The AutoMARK needs to be stored and operated in a Pollution Degree 2 for the ambient environment.
- Ordinary Protection (Not protected against harmful ingress of moisture)
- Class I Equipment (Grounded Type)
- Installation (Over-voltage) Category II for transient over-voltages

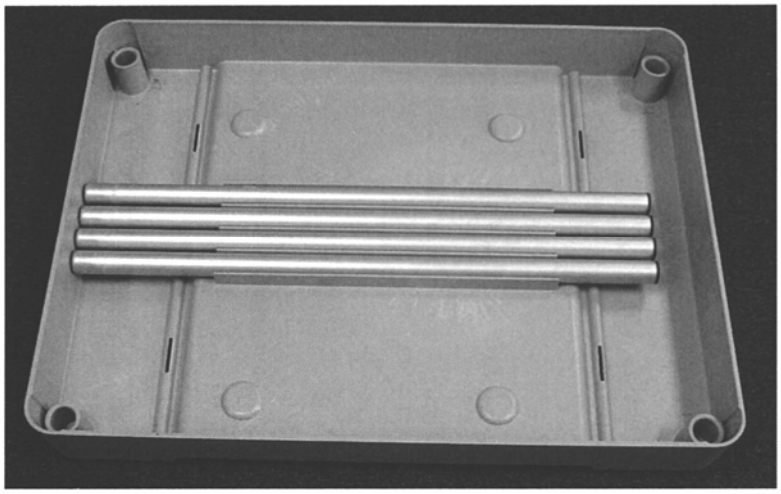
Set Up the AutoMARK Table

To meet the above standards, your poll site may have purchased an AutoMARK table and privacy shield.

Verify: Contact your sales representative for more information about obtaining the AutoMARK table.

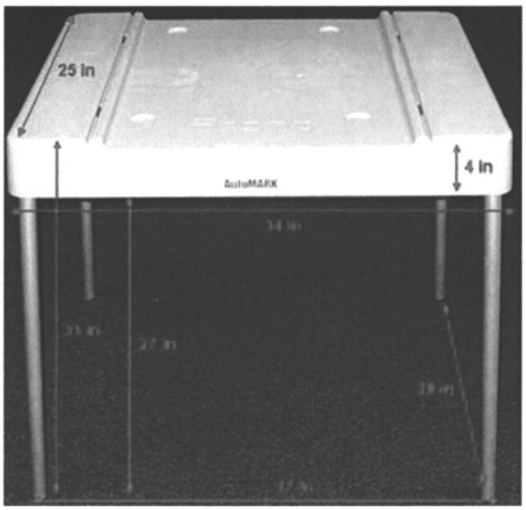
The AutoMARK table comes in five pieces.

It is assembled by inserting the legs into the plastic cylinders located at each corner of the table. The rubber endcaps should be pointed toward the floor.



The dimensions of the tables are as follows:

Table Area	Dimension
Top of table surface	33" wide by 25"dp
Bottom of table surface	34" wide by 26" deep
Leg span	37" wide by 29" deep
Height of table bottom	27"
Height of table top	31"



Caution: Arrange the AutoMARK table with the following considerations: traffic flow, voter privacy, safety and accessibility.

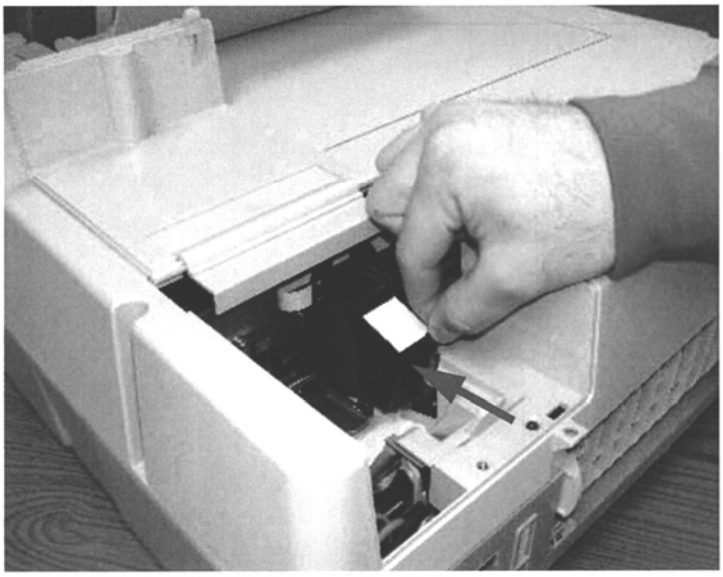
Install a New Printer Cartridge

The AutoMARK system is shipped without the ink cartridge installed. The ink cartridge should be installed prior to using the system for voting. The system writes with a Hewlett Packard printer cartridge. This is a black-only cartridge. A new printer cartridge should be installed prior to each election.

The access to the printer cartridge is provided by a door in the right rear corner of the unit. With the door off, the rechargeable battery is also accessible.

Take the following steps to install a new printer cartridge.

1. Open the rear access door to view the holding unit for the printer cartridge (see the preceding picture.)
2. Open the new printer cartridge package.
3. Insert new printer cartridge into AutoMARK.



When installing a printer cartridge, take care not to bend the L-shaped piece of metal that has an attached rubber wiper. Contact between the rubber wiper and the printer cartridge is important for the "spit and wipe" function.

4. Close the access door.
5. When the system is operating in TEST mode, choose **SERVICE PRINT CARTRIDGE**.
6. Select **Yes** to indicate that you have inserted a new printer cartridge and to re-set the counter.
7. Click **DONE**.

Charge the Battery (If Installed)

Take the following steps to charge the battery.

1. Plug the power cord into the rear panel of the AutoMARK

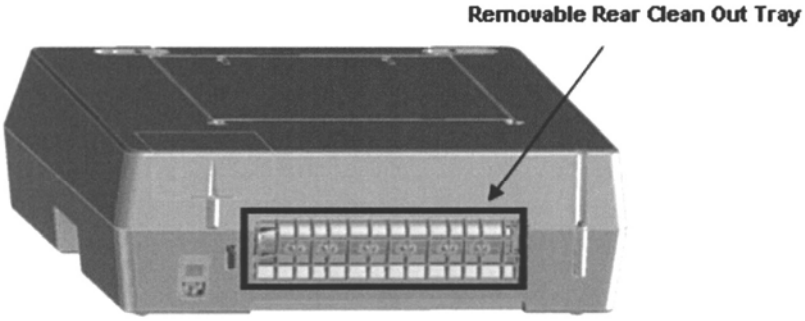
AutoMARK Power Cord Plug-In

2. Plug other end of power cord into your local power outlet.
3. The power meter on the rear panel of the AutoMARK indicates the battery power level. The battery can be fully charged in approximately six hours.

AutoCAST Ballot Box

The AutoCAST ballot box is used to store ballots cast by the AutoMARK for later tabulation. Before attaching the AutoCAST ballot box to the AutoMARK, verify that the rear eject option has been enabled.

The rear clean out tray must be removed, prior to the installation of the AutoCAST. If the rear clean out tray has not been removed, contact ES&S to schedule this necessary maintenance procedure.



Enable Rear Eject

Note: Before enabling the rear eject mode, verify that the modified rear eject tray has been installed on your AutoMARK.

1. Turn the key switch to **Test Mode**.
2. Press **System Maintenance**.
3. Enter the maintenance security code.

Note: Depending on the security strength, the security code can range from 4-16 characters in length, and be comprised of numbers, the '-' symbol, and upper and lower case letters. The screen will display * symbols when you enter the security code.

Reference: The security code is dependant upon the security code strength set in ElectionWare. Refer to Chapter 12: Set Security Strength of the *ElectionWare Systems Operations Procedures Manual* for more information regarding security code strength and how the strength affects the combination of characters in the security code.

4. Press **Rear Eject** and make sure the *Enable for Rear Eject* option is checked. If it is not, touch the square next to the option to enable it.

5. Press **DONE** and confirm with the **Yes** button if the option was changed.
6. Turn the key switch to **ON**.

Reference: See Rear Eject Test for more information on testing the rear eject option.

Assemble and Attach the AutoCAST Ballot Box

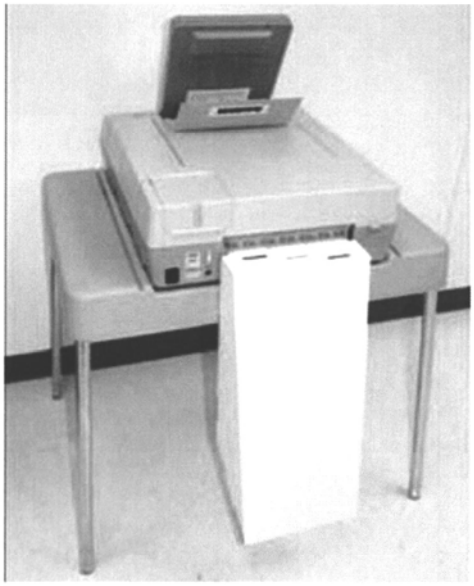
Once you have enabled the rear eject option in the VAT System Maintenance menu, assemble the AutoCAST ballot box and attach it to the rear of the system.

The AutoCAST ballot box comes manufactured in two different materials: cardboard and plastic. Use the appropriate section in this chapter to assemble and install your particular version of the AutoCAST.

Reference: See Assemble the Cardboard AutoCAST Ballot Box for information on assembling and installing the cardboard version of the AutoCAST.

Or,

See Assemble the Plastic AutoCAST Ballot Box for information on assembling and installing the plastic version of the AutoCAST.



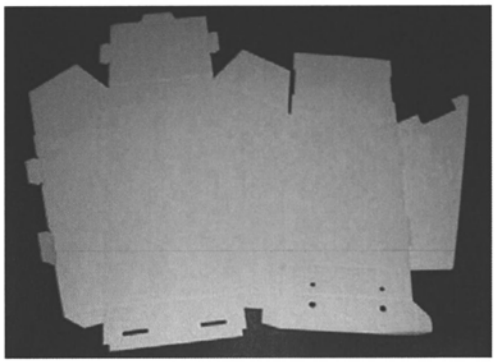
Cardboard AutoCAST

Plastic AutoCAST

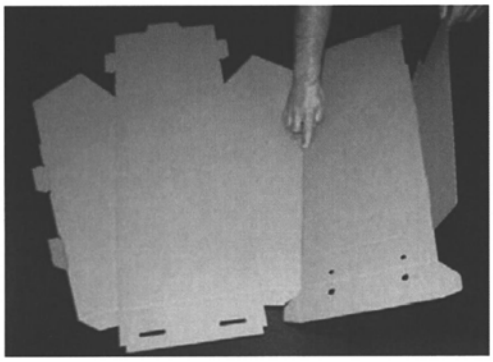
The following Instructions explain how to assemble and attach both versions of the AutoCAST ballot box.

Assemble the Cardboard AutoCAST Ballot Box

1. Lay the AutoCAST ballot box flat on a table or floor.

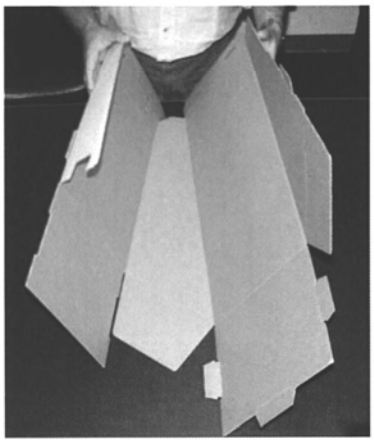


2. Pre-fold the creased lines to make it easier to assemble the box.

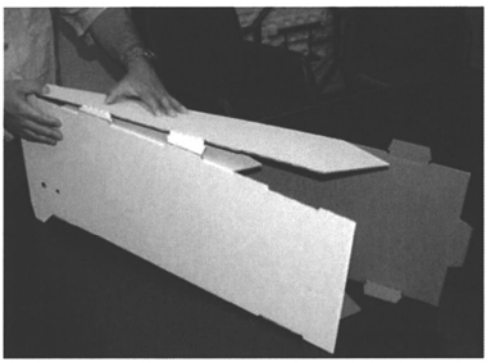


3. With the square edges facing towards you, lift the right and left ends (short ends) toward the center.

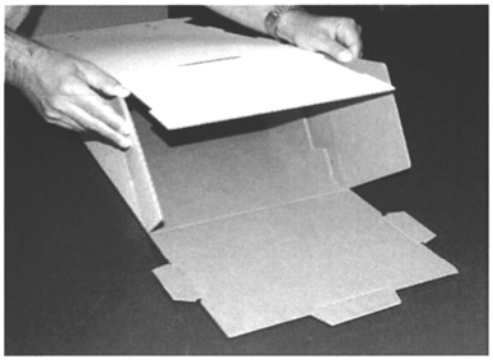
The angular side must come underneath the tabbed side.



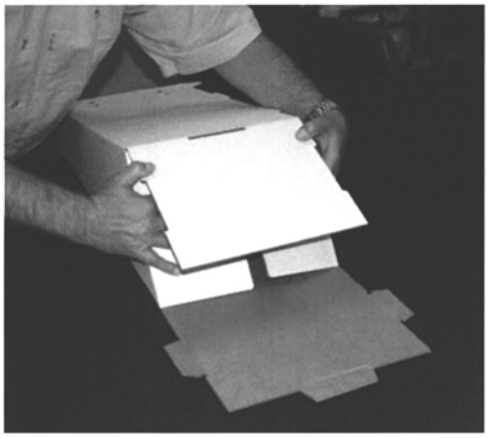
4. Insert the two tabs into the two slots.



5. Fold the two outer flaps inward.

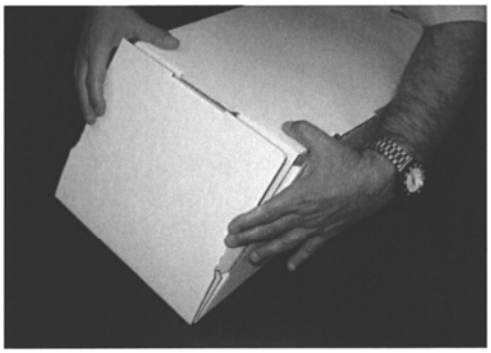


6. Fold the top flap down.

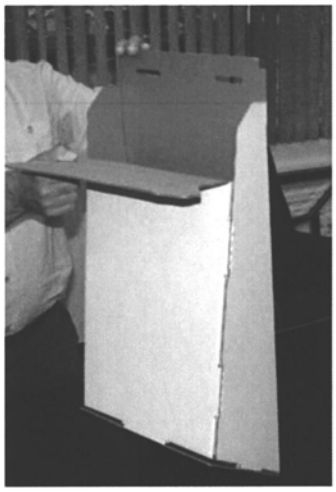


7. Fold the bottom flap up.

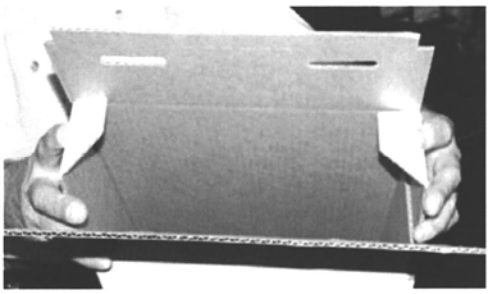
8. Insert the top, right and left tabs.



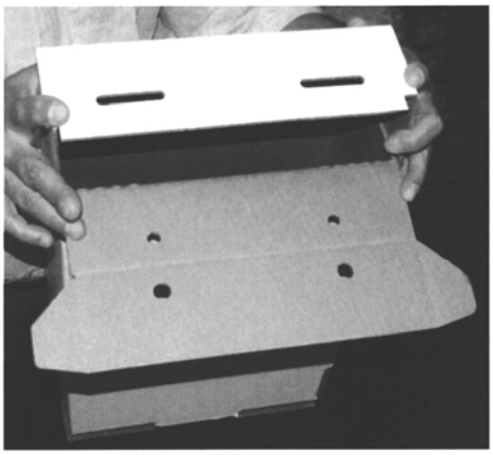
Your assembled AutoCAST ballot box should look like the following.



9. Fold the right and left tabs inward.

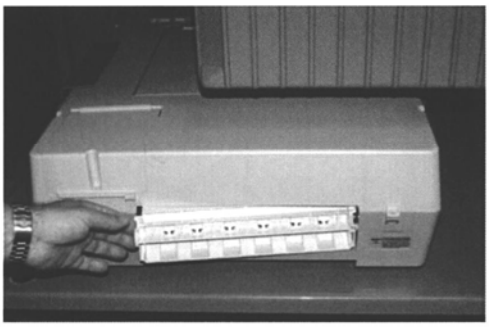


10. Fold the top flap down.

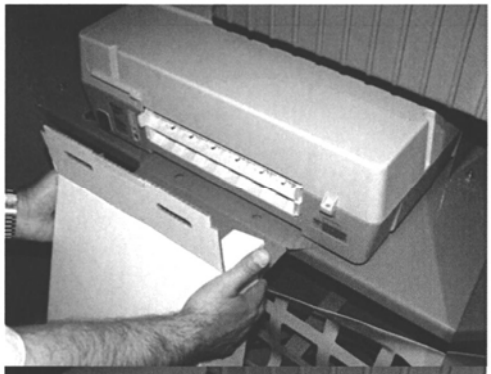


Attach the Cardboard AutoCAST Ballot Box to the AutoMARK

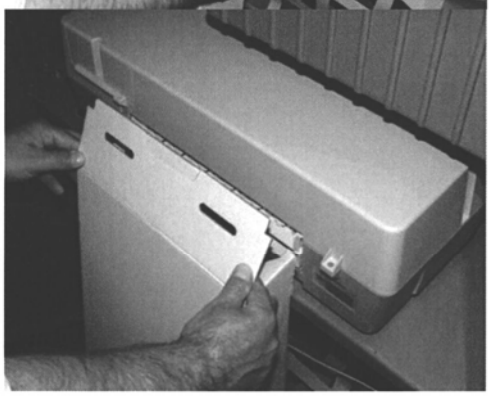
11. Be sure the AutoCAST Rear Clean Out Tray is installed.
12. Pull the AutoMARK toward the end of the cart or table.



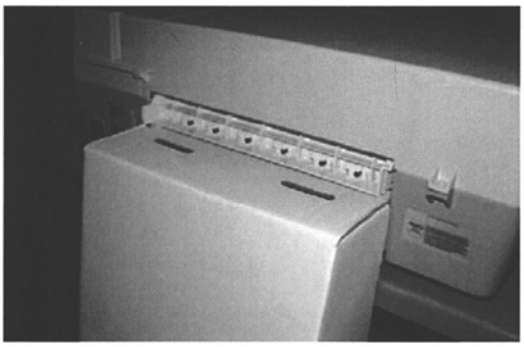
13. Slightly lift up on the AutoMARK and insert the end (with the two holes). The weight of the AutoMARK will hold the ballot box in place.
14. Be sure to center the ballot box underneath the unit.



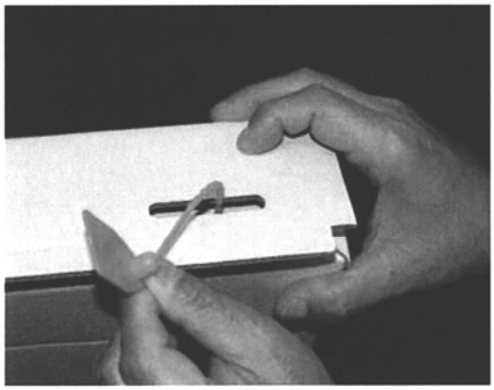
15. Insert the top flap of the ballot box underneath the center rib of the AutoCAST Rear Tray section of the AutoMARK.



The AutoCAST ballot box should appear as it does in the adjacent picture, when it is correctly attached to the AutoMARK.



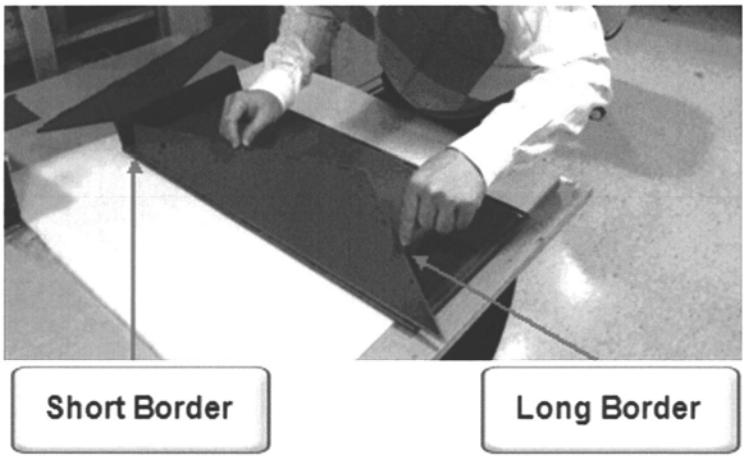
Be sure to apply any security seals in accordance with local election security policies and procedures.



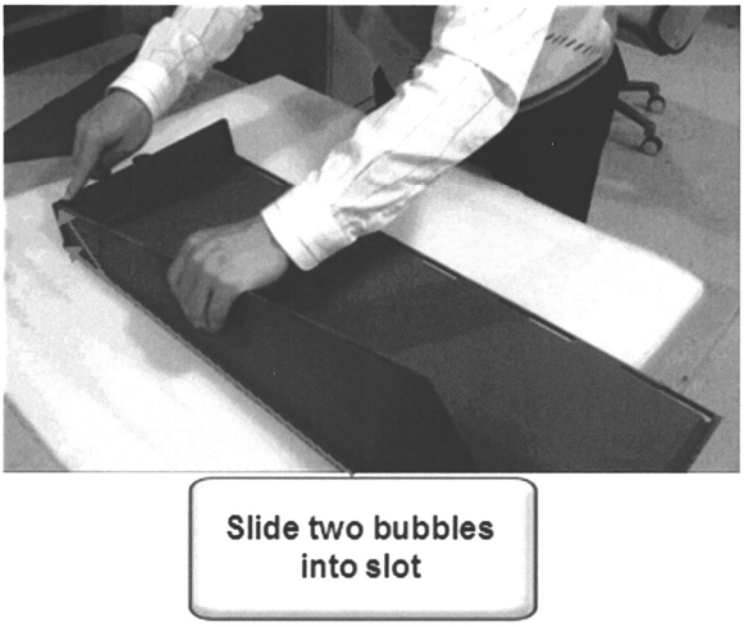
Reference: See Rear Eject Voting Options for more information on casting a ballot using the rear eject option and the AutoCAST.

Assemble the Plastic AutoCAST Ballot Box

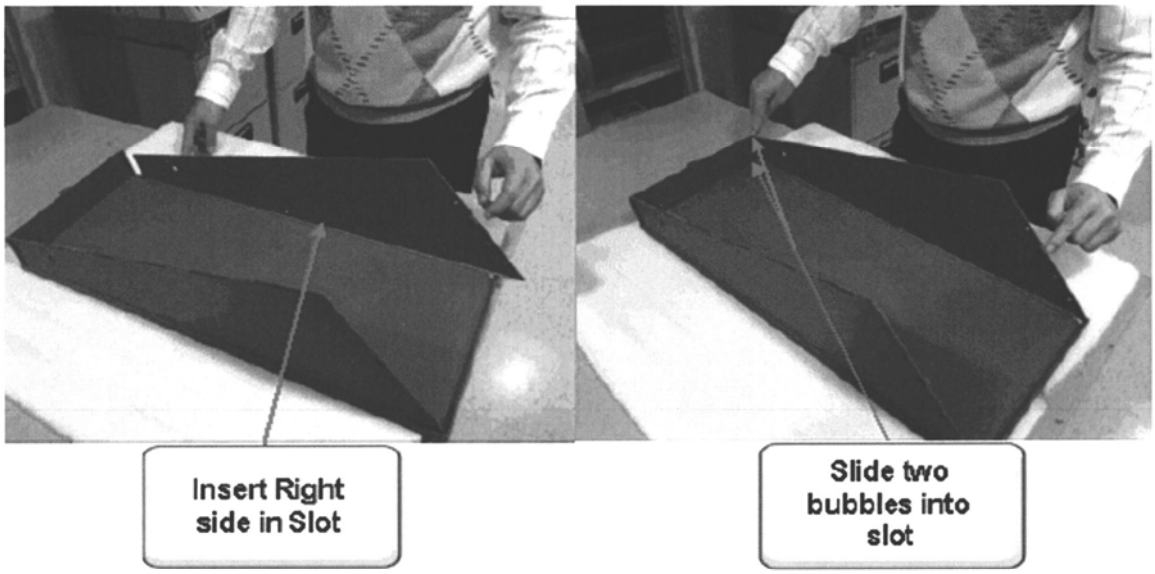
1. Lay the back of the ballot box on a flat surface or table.
2. With the angled top section of the back plate of the ballot box facing upward, slide the left-hand plate of the ballot box into the groove in the left side. Make sure that the short border is pointed toward the angled top section of the back plate.



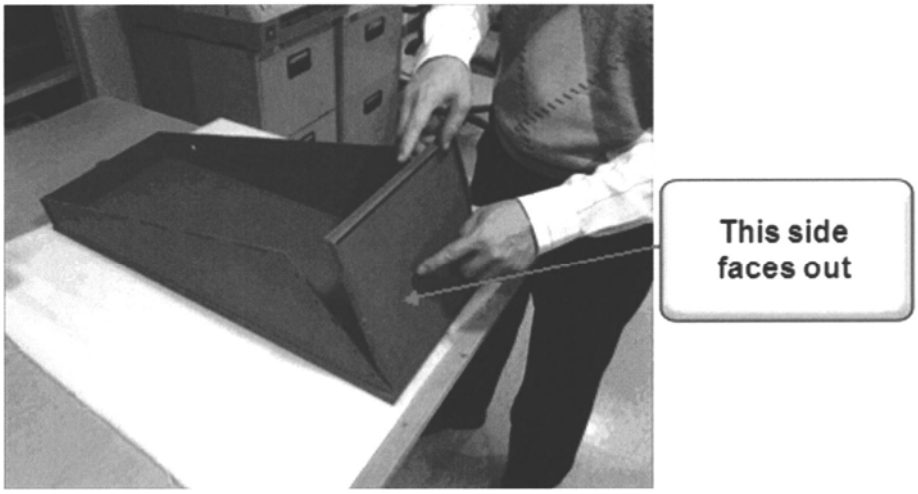
3. Slide the left plate up to the short angle of the back plate until the two bubbles slip into their slot.



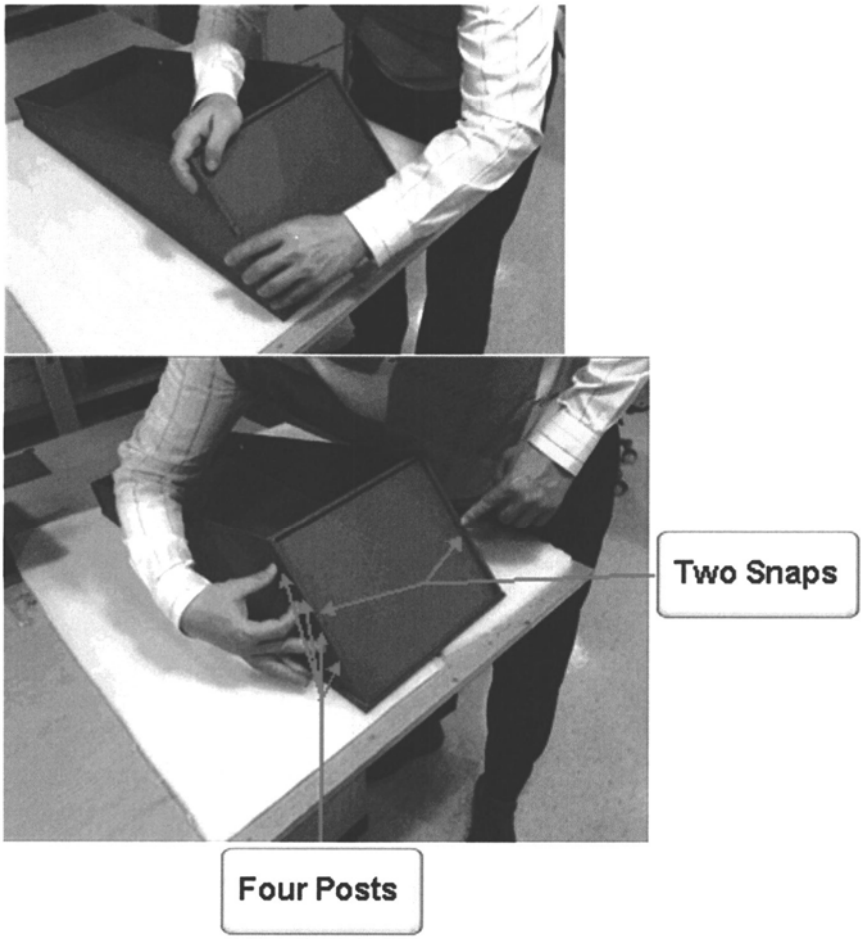
4. Repeat steps 2. and 3. for the right side of the ballot box.



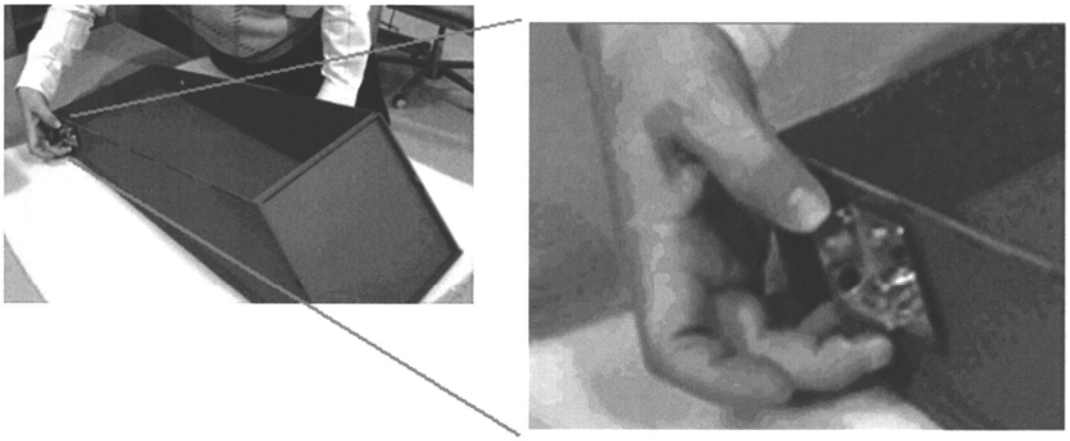
5. With the side delineated in the graphic below facing outward, slip the bottom plate into the groove at the bottom of the back plate.



6. Pivot the bottom plate inward until the pegs line up with the holes in the right and left sides. Then use the snaps to lock the bottom plate in place.



7. Install the door hinges on the left and right sides of the ballot box using the available hardware as in the image below.

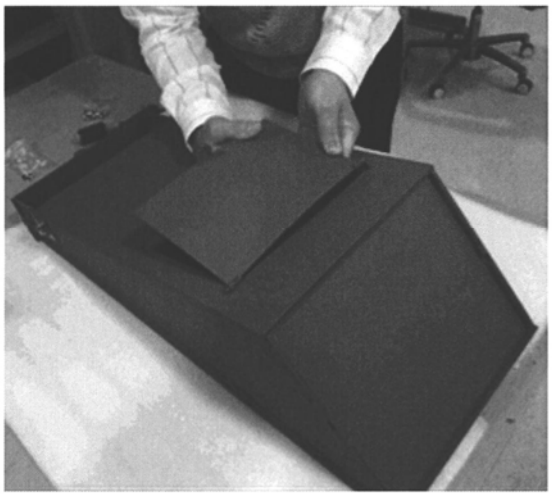


8. Snap the front panel in the slot in the right-hand side, making sure to keep the large slot toward the long border, (bottom) of the box.

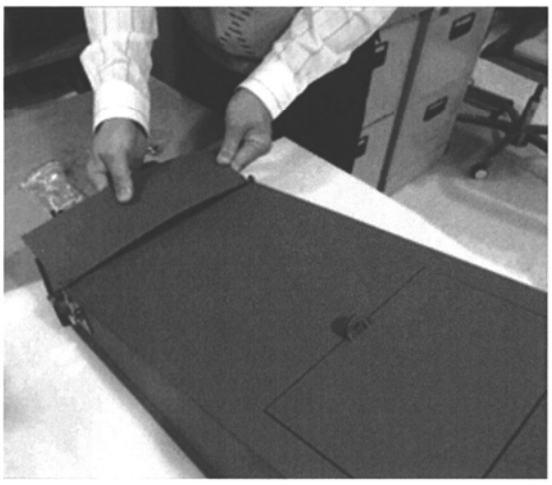
9. Pivot the front of the ballot box until it closes, making sure it lines up with the left side.

10. Grip the front panel of the ballot box using the large slot at the bottom. Pull the front panel toward you until it lines up with the bottom panel.

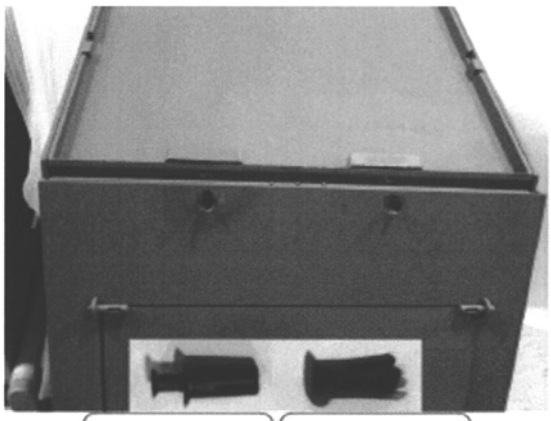
11. Insert the pegs of the lower door in the slots located at the bottom of the front panel by gently flexing the door inward as indicated in the graphic below.



12. Using the same process, as in step 11., install the upper door as illustrated in the graphic below.



13. With the bottom end of the front panel facing you, install the rivets at the base of the ballot box where the front and bottom panels meet.

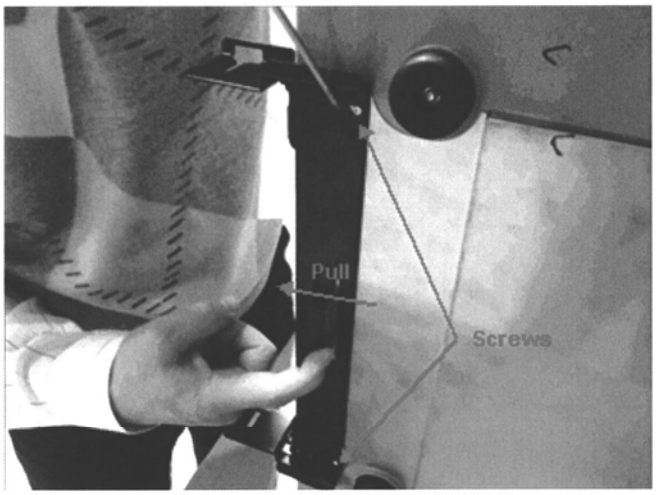


Before Assembly | After Assembly

Attach the Plastic AutoCAST Ballot Box to the AutoMARK

1. Loosen the screws on the bottom back side of the AutoMARK.
2. Install the AutoCAST bracket on the backside of the AutoMARK leaving the screw loosened.

3. Pull the bracket towards the back of the unit, until the screws lock in place.
4. Tighten down the screws on the AutoMARK to lock the AutoCAST bracket in place.



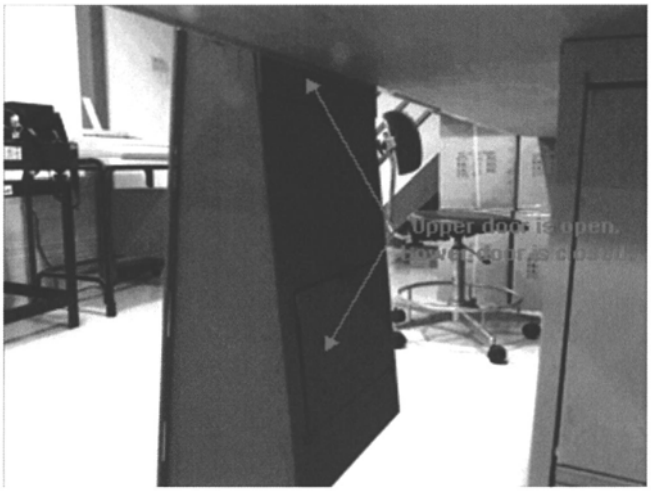
5. Using the hinges installed in step 7., hang the ballot box on the back of the AutoMARK.

6. Slide a seal trough the AutoCAST hinge to secure the ballot box.

Sealed Door Hinge

7. To ensure that the AutoMARK and AutoCAST are ready for use, verify that the upper door of the AutoCAST is open and that the lower door of the AutoCAST is closed.

Reference: See Rear Eject Voting Options for more information on casting a ballot using the rear eject option and the AutoCAST.



Install the Flash Memory Card

You must provide a compact Flash Memory Card (FMC) that contains the data pertaining to your election (contests, candidates or choices and setup instructions).

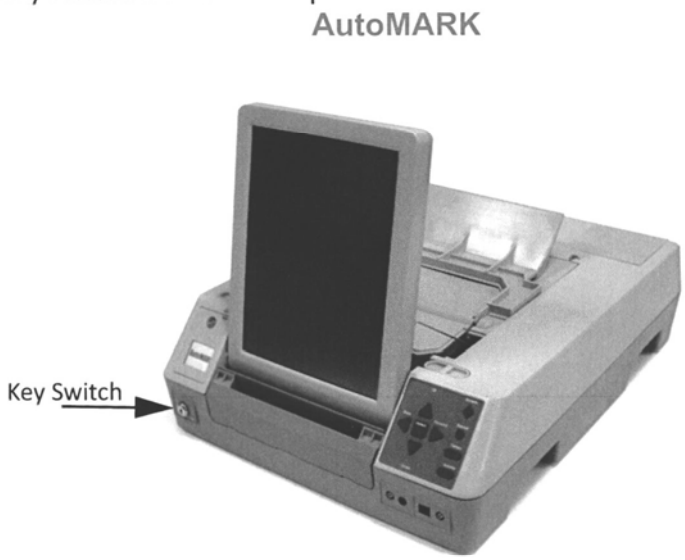
In most Jurisdictions, the Flash Memory Card (FMC) will be installed into the AutoMARK by the Jurisdiction Personnel, (not by the Poll Worker), prior to Election Day.

However, some Jurisdictions may prefer to deliver the VAT and the Flash Memory Card separately, so that the Poll Worker will need to install the FMC into the VAT. If so, here are the steps to follow.

The FMC must be correctly programmed before it is inserted into the AutoMARK.

Take the following steps to install the FMC.

1. Verify the key switch is in the OFF position.

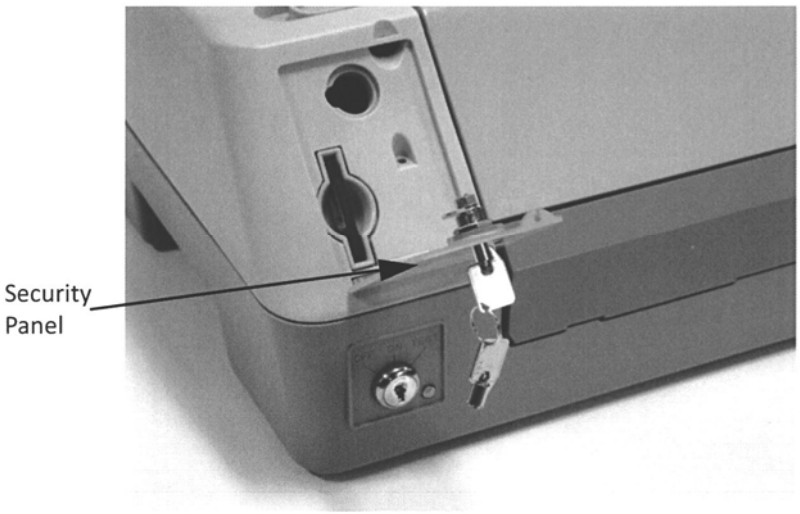


2. Use the security key to open the security panel.
3. Touch the key switch with one hand to discharge any static buildup.
4. With the Flash Card Memory Card label facing out (to the left of the terminal), insert the card with the connector end (with 50 tiny holes) into the unit.

Note: Do not force the card into the terminal. This could result in bent pins which reside inside the compact flash slot. If this happens, the AutoMARK must be repaired because the card will no longer work in the terminal.

5. Gently line up the card so the pins insert into the FMC holes and press the card into place.

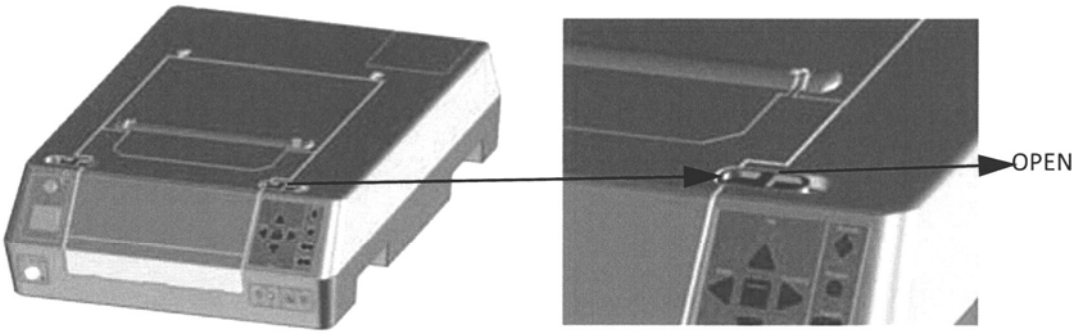
6. Lock the security panel.



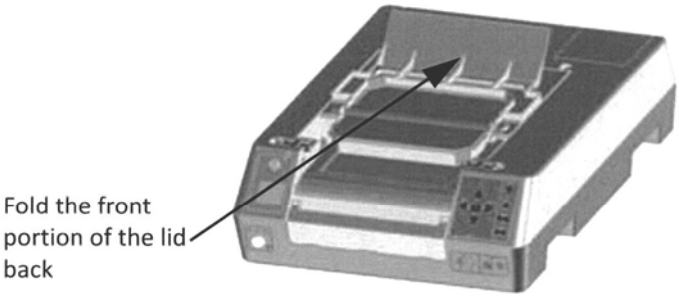
Open the LCD for Use

Take the following steps to open the AutoMARK LCD for use on Election Day.

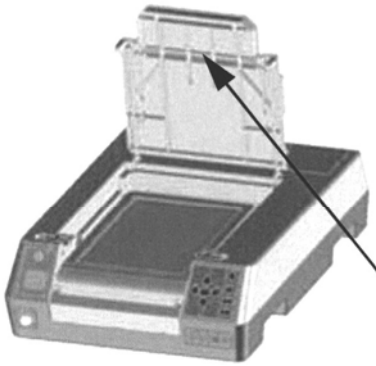
1. Move the left and right sliding latches outward to unlatch the lid.



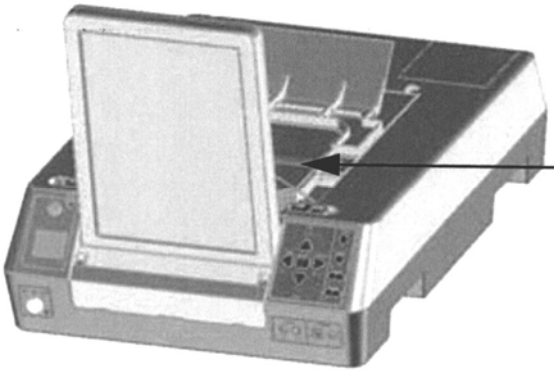
2. Fold the front portion of the lid back.



3. Rotate the lid assembly to vertical.



4. Raise LCD screen, and close the lid behind, leaving the front lid section rotated back.



5. Lower the ballot feed tray.

Test the AutoMARK Operations

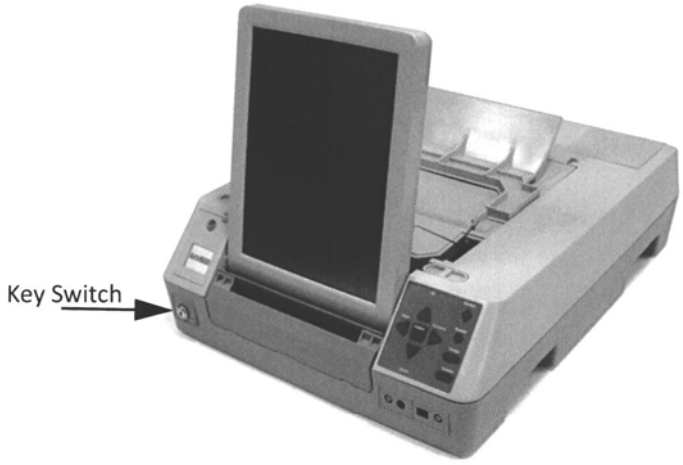
Usually, these tests are performed by technical personnel in the Jurisdiction prior to Election Day. The Poll Worker should perform these tests only if instructed to do so by your Jurisdiction. If so, the Jurisdiction will provide you with test ballots for this purpose.

If these tests have already been performed by the Jurisdiction personnel prior to Election Day, it is not necessary for the Poll Worker to perform these tests again. (Doing so will result in a Spoiled Ballot.)

The AutoMARK operations should be tested when the system is operating in the TEST mode.

Take the following steps to test The AutoMARK operations.

1. Lift the display screen to an upright position and turn the key switch to TEST.



2. When prompted, enter the Security Code you defined in ElectionWare. This will unlock the Compact Flash Media. The system will begin decrypting and verifying the Compact Flash Media.

Reference: See the *ElectionWare Systems Operations Procedures* manual for more information regarding security codes.

3. Select **Test Ballot Print**.
4. If using a ballot with a removable stub, remove the stub before inserting the ballot

5. Insert an unmarked ballot. The AutoMARK will fill all ovals and print the name of each candidate next to the oval. Verify that each oval is filled and each candidate name is printed in the proper place on the ballot. If the marks appear off, the printer may need to be re-calibrated.

Reference: See the *ElectionWare Systems Operations Procedures* for information about how to recalibrate the printer.

6. Select **Done**.

Display Screen Test

1. Turn the key switch to the ON mode position.
2. The **Insert Your Ballot** screen should be displayed. If not, check all power connections to ensure power is being supplied to the AutoMARK.

Ballot Insert Test

1. If using a ballot with a removable stub, remove the stub before inserting the ballot.
2. Insert an unmarked ballot (corresponding to the FMC currently installed) into the AutoMARK paper tray
3. The paper feed mechanism should feed your ballot into the AutoMARK. If the test is successful, the AutoMARK scans the ballot and displays a new screen. If the test is not successful, the AutoMARK attempts to eject the ballot or displays an error message.

Audio Test

Plug in your headphones and use the audio keys on the keypad to test the audio operations as follows:

1. Press the round Audio **Repeat** key to repeat the presentation.
2. Press and hold the round Audio **Repeat** key to pause the audio. If keypad beeps are enabled, there will be a beep when pause is initiated.
3. Press the left side of the Audio **Tempo** key to decrease the audio speed.
4. Press the right side of the Audio **Tempo** key to increase the audio speed.
5. Press the left side of the Audio **Volume** key to decrease the audio volume.

6. Press the right side of the Audio **Volume** key to increase the audio volume.

Note: The Tempo button does not affect Audio speed for .WAV files. Languages that use audio files for prompts and instructions include Cantonese, Vietnamese, Tagalog, and Creole.

Cancel A/V File Check

For elections with a lot of data, to reduce startup time, you can bypass the need for AutoMARK to look at graphics and audio files for corruptions and alterations. Selecting the Enable for Bypass Graphic and Audio Option check box in System Maintenance turns on this bypass option.

How the bypass graphics and audio files option works:

- If the option *is* turned on, the system does not check the graphics and audio files on startup if you press the Bypass Check button on the Decrypt and Verify Files screen.
- If the option *is not* turned on, the system checks the graphics and audio files on startup.

Leave the Enable for Bypass Graphic Audio Option check box unselected or deselect it if you want to prohibit your poll workers from bypassing the graphics and audio files check.

Turning on the bypass option

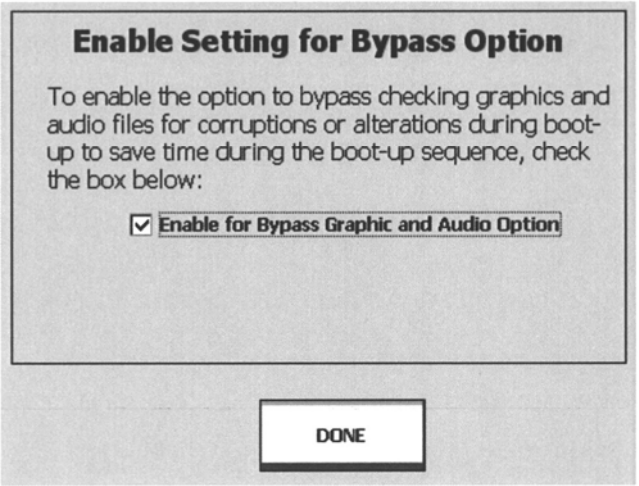
The following steps assume that the Enable for Bypass Graphic and Audio check box is cleared. Do the following to turn on the bypass option:

1. With the AutoMARK in the **ON** mode, turn the mode key switch to the **TEST** mode position.
2. On the **AutoMARK Main Menu** screen, press the **System Maintenance** button.
3. On the **Enter Security Code** screen, type the administration code and press **Accept**.

Note: Make sure to observe upper, lower case, and the '-' symbol when typing the code.

4. On the **AutoMARK System Maintenance** menu, press the **Cancel A/V File Check** button.

5. On the **Enable Setting for Bypass Option** screen, select the check box next to **Enable for Bypass Graphic and Audio** and press the **DONE** button.



6. On the **Confirmation** dialog box, press **Yes** to save the new setting.
   - You also have the option to press **No** to cancel the save process and retain the current setting.
7. On the **AutoMARK System Maintenance Menu** screen, press **DONE** to return to the **AutoMARK Main Menu** screen.
8. Turn the mode key switch to the **OFF** mode position until the system shuts down.
9. Turn the mode key switch to the **ON** mode position.
10. Verify that the **Bypass Check** button appears on the **Decrypt and Verify Files** screen during startup.
11. Press and momentarily hold the **Bypass Check** button.

The system will continue to check the non-graphics and audio files for corruptions and alterations and present the Insert Your Ballot screen.

Note: You can also turn on the Enable Bypass Check option if the AutoMAR

Ballot Read Test

1. Insert a marked ballot into the AutoMARK paper tray.
2. The paper feed mechanism should feed your ballot into the AutoMARK. If the test is successful, The AutoMARK scans the ballot and displays the **Language Selection** screen (if your jurisdiction is programmed for more than one language) followed by the **Verification Summary** screen. If the test is not successful, the AutoMARK attempts to eject the ballot or displays an error message.

Ballot Print Test

1. Turn the key switch to **Test Mode**.
2. Press **Test Ballot Print**.
3. If using a ballot with a removable stub, remove the stub before inserting the ballot.
4. Insert a ballot that is recognized by the currently inserted Flash Memory Card. Use a spare ballot that is not needed, because the AutoMARK will print on this ballot.
5. If the ballot is not recognized, repeat a few times. If it still does not recognize, then press **Done** and return to the test menu.
6. Confirm that the ballot races on the currently inserted Flash Memory Card are the ones that are shown on the screen and match the ballot that you were trying to insert. If they do not match, replace your Flash Memory Card or your ballot.
7. Scrutinize the placement of the marks in relation to the ovals/voting locations on the ballot. If there is any discernible rotation of the marks with respect to the voting locations, uniform across all marks, that is an error greater than 0.05 degrees, or a couple millimeters, calibrate the printer.

Reference: Refer to the *AutoMARK System Maintenance Manual* for information about how to calibrate the printer.

8. Once the marks are printing correctly in all orientations (right-side up, upside down, inserted front-wards, inserted backwards), the printing is working properly.
9. As a final check, move the key switch into test mode and check the ink level. (On the bottom left portion of screen.) If it is lower than 10%, replace the printer cartridge. If you do, make sure to reset the ink level meter using the Replace Ink Cartridge button from the test mode menu.

Note: The Print Ballot Test should only be used to test positional accuracy. For tabulation logic and accuracy testing always test printed ballots with precinct based, or central count ballot tabulation equipment.

Rear Eject Test

1. Turn the key switch to **Test Mode**.
2. Press **System Maintenance**.
3. Enter the maintenance security code.

Note: Depending on the election code strength, the code can range from 4-16 characters in length, and be comprised of numbers, the '-' symbol, and upper and lower case letters. The screen will display * symbols when you enter the code.

Reference: The election code strength is dependant upon the code strength set in ElectionWare. See the *ES&S ElectionWare System Operations Procedures* manual for more information regarding code strength and how the strength affects the combination of characters in the code.

4. Press **Rear Eject** and make sure the *Enable for Rear Eject* option is checked.
5. Press **DONE** and confirm with the **yes** button if the option was changed.
6. Turn the key switch to **ON**.
7. Insert a ballot that is recognized by the currently inserted Flash Memory Card. Use a spare ballot that is not needed, because the AutoMARK will print on this ballot.
8. Wait for the ballot to be recognized and vote the ballot normally. Press **Mark Ballot** when the final screen is reached.
9. The ballot will be re-scanned to detect the newly printed marks and a summary presented. Press **NEXT**.
10. When presented with a choice of whether to cast the ballot in a secure container, choose the option to **Auto-Cast Ballot into Secure Container**.
11. The ballot should be ejected out of the rear paper tray.

Multiple Page Ballots

If each ballot has multiple pages, ensure that each page is set up with unique timing marks recognizable by the VAT. Test each page using the instructions under the Ballot Print Test heading in this chapter. When voting, each page of the ballot needs to be voted, marked, and ejected before the next page can be inserted into the VAT.

Note: Each page of a multiple page ballot will increment the lifetime print count located at the bottom of the screen while in test mode.

Ballots Using Tinted or Colored Stock Paper

When using ballot stock that is colored or heavily tinted, perform the following steps to improve ballot scanning by the VAT.

1. Go to Test MODE by turning the key switch to the test position.
2. Press **System Maintenance**.
3. Enter the administration code.

Note: The administration code is 8-16 characters in length, comprised of numbers, the '-' symbol, and upper and lower case letters. The screen will display * symbols when you enter the security code.

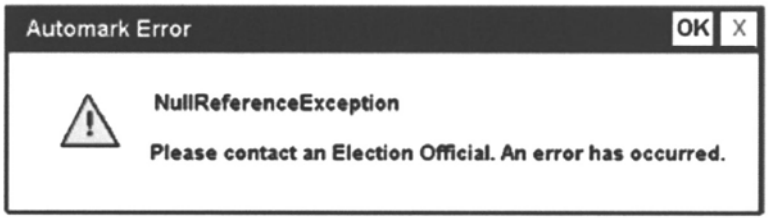
4. Press **OK**.
5. In the System Maintenance menu, press **Ballot Type Selection.**
6. Make sure **Enable for Colored Ballots** is checked. (With white ballots this option should be cleared).
7. Press **DONE** and **Exit**.

Using Poll Booth Signage for Non-English Speaking Voters

The AutoMARK provides its instructions in a number of languages. The exception to this is that the "**OK**" button appears the same for all. If the translators in your Jurisdiction believe that this may cause confusion, you may need to include additional instructions in the polling booth.

Also, the international symbol ⚠ may accompany various error messages which may not be translated into the voter's native language. For this reason, the Jurisdiction may wish to place a multi-lingual sign in the polling booth that explains that the symbol means an error has occurred and they should alert one of the election officials.

For example:



Set Up the AutoMARK for Voters

Take the following steps to set up the AutoMARK for normal operations.

1. Follow the Start Up Procedure to start the AutoMARK.
2. If headphones are being supplied by the polling place, plug the headphones into the audio jack.
3. If the voter needs to use a Puff-Sip device, plug the Puff-Sip device into the Assistive Technology (AT) access port.
4. For a blind voter, direct him to the AutoMARK, and assist him while he inserts his ballot for scanning. Tell him that the scanning process will take around 30 seconds, and that the VAT will be silent during the scanning process. When the scanning process is complete, the VAT will give him audio instructions for completing his ballot.
5. The AutoMARK is designed for use in conjunction with the AutoMARK table which provides the voter with a privacy shield, complies with all AT accessibility requirements, and ensures stability against movement, or overturning during entry occupancy or exit by a voter. Alternatively, the AutoMARK may be used in conjunction with any AT compliant table that provides adequate structural stability for unit of the AutoMARK's size and weight and a privacy screen. Both of these items are commercially available from a number of sources.

AutoCAST Count

Although the AutoMARK accessible equipment is not a tabulator, the system does contain the functionality to count the number of ballots cast into the AutoCAST ballot box. This count does not contain vote totals, but only the number of ballots cast during voting.

Reset AutoCAST Count

To reset the AutoCAST count, follow the directions below:

1. Turn the key to **Test**.
2. When prompted, enter the appropriate security code.
3. Once the AutoMARK System Maintenance Menu appears, press the **Reset AutoCAST Count** button.
4. When prompted, press **Yes** to reset the AutoCast count.
   - Or, press **No** to cancel the process.

Chapter 6: Assisting Voters

Assisting a Voter with Initializing the System

Inserting a ballot initializes the system.

Assisting a Vision Impaired Voter

Direct the vision-impaired voter to the AutoMARK.

Show them the keypad, and show them where to insert their ballot. Assist them while they insert their ballot for scanning (if they desire assistance). Tell them that the scanning process will take around 30 seconds, and that the VAT will be silent during the scanning process. When the scanning process is complete, the VAT will give them audio instructions for completing their ballot.

Assisting a Voter with Ballot Insertion

If the voter needs help inserting a ballot, try inserting the ballot yourself.

If the system fails to recognize the ballot, note the error message on the screen,

Refer to the heading in Chapter 12: Troubleshooting for information about error messages.

In the table listing error messages find the error, and follow the instructions in the Solution column.

Assisting a Voter who uses an Assistive Technology (AT) Device

Take the following steps if a voter is using an AT device.

1. Insert the ballot for the voter.
2. Read the following instructions to the voter.

   You have plugged in an AT device. This allows you to navigate through your ballot using YES or NO inputs.

When a screen is displayed, you may select NO to bypass that screen or YES to move to the first selectable choice on that screen. When you are on a selectable item of the screen, the item will be highlighted in yellow. Selecting NO will move on to the next selectable item on the screen. Selecting YES will provide the same results as if you had selected that item.

When on a candidate or question choice YES will select or deselect that candidate.

When on a MORE scroll bar, YES will cause the screen to scroll up or down as indicated.

When on a screen button, YES will invoke that action. For example, entering YES when ZOOM is highlighted will cause the screen to ZOOM. Entering YES again, will return the screen to non-zoomed mode.

Pressing NO at any time will move to the next highlighted item.

As you enter NO repeatedly, the highlight will move down the screen, across the bottom from right to left and then loop back to the top.

When you are done making selections on any given screen, enter NO repeatedly until the yellow highlight is on the NEXT button and then enter YES to move to the next screen.

An AT input device does not provide access to the following functionality.

- Adjusting the volume of the audio.
- Adjusting the tempo of the audio.
- Repeating the audio of the screen.
- Turning the display screen on and off.

It can take up to 6 seconds for the AT device to be recognized by the VAT when it is plugged in.

When using an AT device with Cantonese, Tagalog, Vietnamese, or Creole it is recommended that headphones also be used for additional voter feedback

Chapter 7: Voter Assistance Guide

Note: The following types of tabulators work with the AutoMARK:

- ES&S DS200
- ES&S Model 850

The AutoMARK is used to mark the ballot selections of voters who are visually impaired, have a disability, or who are more comfortable using an alternative language.

Ballot choices and instructions are displayed in large text print on the touch screen monitor, as well as read by the audio system in the language choice selected by the voter. Voters enter their selections by touching buttons on the screen, pressing keys on the keypad, or using an Assistive Technology (AT) device.

The AutoMARK marks your ballot with your selections and returns them to you. You can then submit your marked ballot in the normal manner for tabulation. This guide contains all the information needed to use the AutoMARK.

Features of the AutoMARK

A voter can use the AutoMARK to mark a ballot by using:

- The touch screen
- The Braille keypad
- An AT device (such as puff-sip or foot pedal)

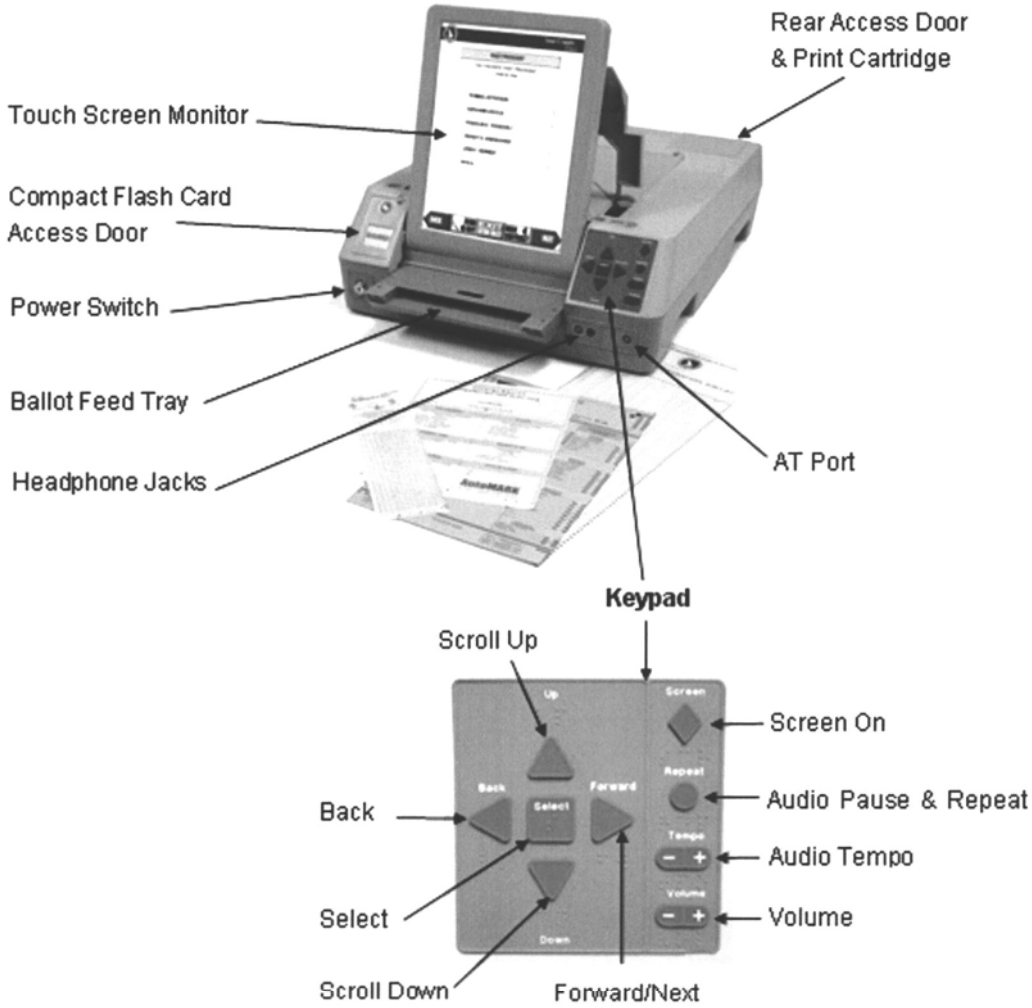
The AutoMARK has the capability to display your ballot in alternate languages. Language choices are determined by your jurisdiction. If you are not able to view the language selection screen, your jurisdiction has chosen to provide English as the only language. The audio matches the language selected.

The AutoMARK has several privacy features. Audio volume can be increased or decreased as desired, and the screen can be turned on and off for privacy. If you want to use the audio system to listen to ballot choices and instructions, you will use the audio keys on the keypad (shown on the following page) to control audio sound. Headphones with disposable earpieces may be provided by your election officials.

The AutoMARK also has a **ZOOM MODE** feature which enlarges the text on the screen, and a **High Contrast** mode which gives contrast to the screen resolution, for those who are visually impaired.

Note: In order to see which ballot style you loaded into the VAT with a multiple language election, do not use High Contrast mode until the instructions screen. When using both Zoom mode and High Contrast mode, initiate Zoom mode first on the instructions screen.

The AutoMARK consists of the labeled components shown in the following picture.



Note: Audio Repeat and Pause functionality:

- Briefly pressing the Repeat button will cause the current spoken label to repeat after a 5 second pause.
- Holding down the Repeat button for 3 seconds will cause the audio to pause. Briefly hit the Repeat button again to resume audio.

Using the AutoMARK Keys and Buttons

The AutoMARK is designed so that you can use either the keys on the keypad, an AT device, or touch displayed text and buttons on the screen to enter your selections.

When you press the keys on the keypad or touch text or buttons on the screen, you are actually sending operating instructions (commands) to the computer. (For example, pressing the **Screen Off/On** key on the keypad tells the computer to turn the touch screen monitor off or on.)

Touch screen buttons in the picture below appear at the bottom of a screen.

Note: The buttons in the following illustration do not appear on every screen.

Sample of Touch Screen Buttons

Touching the **BACK** button displays the previous screen.

Touching the **ZOOM IN/OUT** button on any screen increases and decreases the size of the text displayed.

Touching the **EXIT RETURN BALLOT** button displays the **EXIT** screen.

Touching the **HIGH CONTRAST** button on any screen lightens or darkens the screen contrast.

Touching the **NEXT** button enters your selection and displays the next screen.

If you want to listen to choices and instructions in the language of your choice and use the keys on the keypad to enter your selections, plug in your headphones, or use the headphones provided.

Note: Audio includes keypad instructions. Therefore, no further audio and keypad information is included in this guide.

Using the AutoMARK with an AT Device

The AutoMARK is designed to work with AT devices such as:

- Puff-sip
- Foot pedal

The AutoMARK allows a Voter with an AT device to perform all of the selections available on the key pad or touch screen. When using an AT device the system responds to a *yes* or *no* action. The AutoMARK allows you to complete a ballot entirely with the aid of and AT device.

Note: AutoMARK users can eject their ballot into a privacy sleeve, which can then be transported by the voter or assisting poll worker to the ES&S DS200 and inserted into the scanner. If there are no ballot handling exceptions, the DS200 deposits the ballot in the ballot box. If there are exceptions, the poll worker must confirm with the voter that the ballot is to be cast as is. For more information regarding the use of a privacy sleeve, see Voter Assistance Using the Privacy Sleeve.

Instructions for Use of an AT Device

When a screen is displayed, you may select **NO** to bypass that screen or **YES** to move to the first selectable choice on that screen. When you are on a selectable item of the screen, the item will be highlighted in yellow. Selecting **NO** will move on to the next selectable item on the screen. Selecting **YES** will provide the same results as if you had clicked on that item.

When on a candidate or question choice **YES** will select or deselect that candidate.

When on a **MORE** scroll bar, **YES** will cause the screen to scroll up or down as indicated.

When on a screen button, **YES** invokes that action. For example, entering **YES** when **ZOOM** is highlighted causes the screen to ZOOM. Entering **YES** again, returns the screen to non-zoomed mode.

Pressing **NO** at any time will move to the next highlighted item.

As you enter **NO** repeatedly, the highlight will move down the screen, across the bottom from right to left and then loop back to the top.

When you are done making selections on any given screen, enter **NO** repeatedly until the yellow highlight is on the **NEXT** button and then enter **YES** to move to the next screen.

If you encounter a problem operating the AutoMARK Voter Assist Terminal, please ask an election official for assistance.

An AT input device does not provide access to the following functionality.

- Adjusting the volume of the audio.
- Adjusting the tempo of the audio.
- Repeating the audio of the screen.
- Turning the display screen on and off.

It can take up to 6 seconds for the AT device to be recognized by the VAT when it is plugged in.

When using an AT device with Cantonese, Tagalog, Vietnamese, or Creole it is recommended that headphones also be used for additional voter feedback.

Voting Using the Sip & Puff AT Device

Sip & Puff refers to the device commonly utilized by individuals with disabilities, generally in a wheelchair, and limited to using their mouth on a straw to send inputs to an assistive device such as the AutoMARK. When using a Sip & Puff device with the AutoMARK the voter sips or puffs on the straw to move around the ballot and make selections. Use the following steps to aid a voter through using the Sip & Puff device.

1. Plug the Sip & Puff device into the Access Panel located at the front of the unit.
2. Retrieve the plastic bag with the Sip & Puff mouthpiece and gloves. Put the gloves on and connect the mouthpiece to the Sip & Puff device.

Note: The voter may choose to provide their own straw device.

3. Using only sips and puffs of air, the voter can move around all screens. When the voter arrives at any screen, they use a puff of air to select to use that screen, or suck in air, (sip) to bypass the screen.
4. If the voter selects a screen, the first selection on that screen will be highlighted. They then make a selection by puffing into the straw. To continue to the next selection, the voter will sip on the straw instead. Using this puff, (select), and sip (continue on) method, the voter should be able to make their desired selections.
5. Once all desired selections on a screen have been made, the voter sips to move to the bottom of the screen in order to highlight the **NEXT** button.
6. After highlighting the **NEXT**, the voter puffs on the straw to move forward in the ballot.
7. The voter uses this method of sip and puff to complete voting. When complete, use a privacy sleeve to assist the voter in submitting their marked ballot for tabulation.

Voter Assistance Using the Privacy Sleeve

After the voter's ballot is marked and returned to the voter by the AutoMARK, the poll worker or voter escort may be requested to assist the voter in transporting their ballot to the precinct scanner or ballot box. If local jurisdiction or state laws allow, the disabled voter should be provided with a privacy sleeve that will protect the ballot from being viewed by others. Use the following steps to guide you, or the voter's escort through the process:

Note: Voter assistance may be unnecessary if the AutoCAST secure ballot container is installed at the rear of the AutoMARK.

1. Being careful to respect the privacy of the voter, with the ballot still in the AutoMARK feed throat, slide the hanging portion of the ballot into the privacy sleeve.
2. Gripping firmly on the center of the privacy sleeve, gently pull the ballot out of the AutoMARK.
3. Slide any remaining visible portions of the ballot completely into the privacy sleeve, and escort the voter to the ballot tabulator.
4. Using the Privacy sleeve as a guide, place the ballot into the feed throat of the tabulator.
5. Verify that the tabulator accepts the ballot. If the tabulator reports any exception, the poll worker or voter escort should assist the voter with casting their ballot (if allowed by local jurisdiction or state election law).

Verify: For questions regarding voter assistance in your locality, please contact your local election official.

Chapter 8: Marking a Ballot

The following paragraphs tell you how to mark a ballot if your ballot is currently unmarked and in a readable format. You can use the touch screen or the Braille keypad to make your selections.

Reference: See the Using the AutoMARK Keys and Buttons heading in Chapter 3: Introduction to the AutoMARK for information about how to use the Braille keypad to make your selections.

See the Using the AutoMARK with an AT Device heading in Chapter 3: Introduction to the AutoMARK if you are using an AT device to make your selections

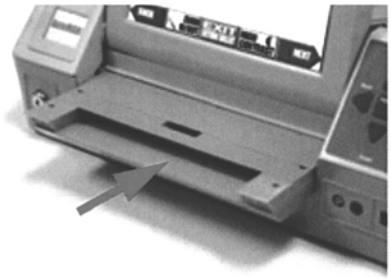
The ***Please Insert Your Ballot*** screen, shown in the following graphic, should be displayed on the touch screen monitor. If not, ask an election official for assistance.

Please Insert your Ballot Screen

Take the following steps to mark your ballot.

Note: If you are using a ballot with a removable "stub", remove the stub before inserting the ballot.

1. **Insert your ballot.** Insert an unmarked ballot. The AutoMARK scans the ballot.



Note: Scanning may take 30 seconds or so and the audio portion of the VAT will be silent during that process.

Note: If you are having trouble inserting a ballot, ask an election official for assistance.

The **Language Selection** screen appears.

Note: The AutoMARK uses marks in the Code Channel to delineate the identification of the ballot. This identification includes the election, polling place, and any other necessary information to verify the authenticity of the ballot. If the ballot is not recognized as being a part of the current election, a warning will be displayed.

Language Selection Screen

Note: If there is only one language choice at your polling place, the next screen automatically appears.

2. Select your language. When multiple language choices are listed on the Language Selection screen, touch the language button to make a choice.

Note: If you touch the **NEXT** button before selecting a language, the default language is selected for you.

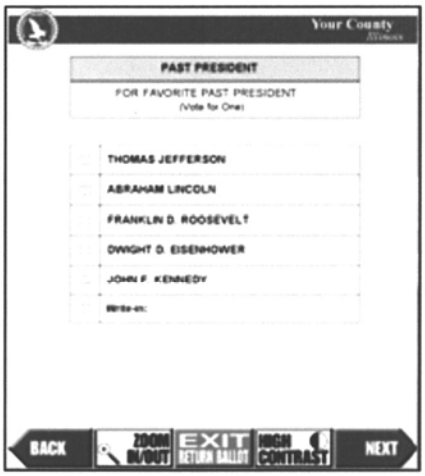
Based on your language selection, the AutoMARK changes the audio language spoken and the Voting Instructions screen appears.

Voting Instructions Screen

Note: If there is only one language choice at your polling place, the Voting Instructions screen automatically appears.

3. Read the voting instructions.
4. Press **NEXT**. The ontest screen appears.

Contest Screen



The AutoMARK displays the names of candidates or choices for the first contest listed on your ballot on the Contest screen.

5. Touch the name of the candidate or choice to indicate your selection.

   The oval displayed next to your choice fills in, indicating your voting selection.

   If one of the choices includes a Write-In and it is selected, a Write-In Pop-Up screen appears. Type in the name of your write-in and press **OK**.

6. Touch **NEXT** to enter your selection.
7. Continue voting until you have completed all contests in this election.

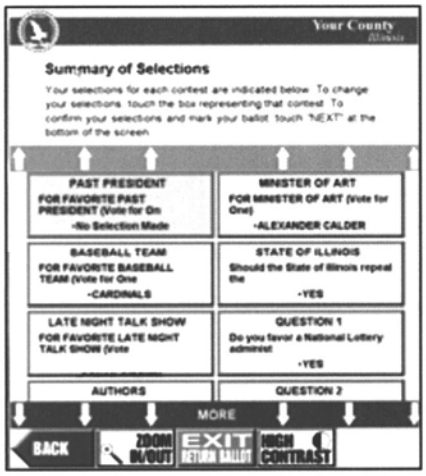
   Since AutoMARK displays one Contest screen for each contest listed on your ballot, several contest screens will appear until you have entered all your selections.

   The AutoMARK also displays various pop-up screens to assist you through this process. For example, if you touch the **NEXT** button before you make a selection, the **Under-Vote** pop-up screen may appear. However, if you make more selections than allowed; the **Over-Vote** pop-up screen will appear.

If there are more candidates in a contest than can be displayed at one time on the screen, you may be forced to view all of them before proceeding to the next contest. (If you touch the **NEXT** button before you have seen all of the candidates, the **ALERT MORE** pop-Up screen may appear.) If the screen is off, you may be forced to listen to all of the candidate selections before proceeding to the next contest.

When all selections have been entered, AutoMARK displays a summary of your selections on the **Summary of Selections** screen.

Summary Screen



8. Scroll through the list and review your selections.
9. If you wish to change a selection:
   a. Touch the **Contest** text box on the Summary screen.
   b. Touch the original selection to deselect that candidate's name or choice.
   c. Touch your new choice and the **NEXT** button to return to the **Summary** screen.

10. When you are satisfied with all of your selections, press **NEXT**. The **Mark Ballot** screen appears.

Mark Ballot Screen

11. Press **Mark Ballot**. The AutoMARK displays the **Print Ballot** screen with a printing progress circle. The circle fills with color to indicate the time remaining to complete the printing process.

Print Ballot Screen

12. When printing is complete, the AutoMARK displays the **Remove Ballot** screen, and ejects your marked ballot into the AutoMARK paper tray.

Remove Ballot Screen

An optional screen may appear directing the voter to verify that the ballot is marked correctly. If this screen appears, select **Next** to eject the ballot into the paper tray.

Note: If a voter is unable to place the marked ballot into a scanner or ballot box, the AutoMARK can insert the marked ballot in the AutoCAST ballot box. AutoCAST is a way for ballots to be inserted into a ballot box without voter interaction, in case the voter cannot physically place the ballot in an optical scanner or a ballot box.

13. Verify the that the ballot is marked correctly.
14. Remove your marked ballot from the paper tray and submit your marked ballot in the normal manner for tabulation.

Chapter 9: Verify a Marked Ballot

This chapter instructs you on how to verify a marked ballot using the AutoMARK.

1. Insert your marked ballot. The **Verification Instructions** screen appears.

Verification Instructions Screen

2. Press **NEXT**. The **Verification Summary** screen that lists your selections for each contest appears.

Verification Summary Screen

3. Review the selections that are marked on your ballot.

4. Press **EXIT** when you are finished verifying your marked ballot selections. The **Remove Ballot** screen appears. The AutoMARK ejects your ballot into the paper tray.

Remove Ballot Screen

5. Remove your marked ballot from the paper tray and submit it in the normal manner for tabulation.

Note: When verifying a marked ballot, the AutoMARK cannot make any changes to your ballot. If you are not satisfied with your marked selections, contact an election official and request a new ballot.

Chapter 10: Frequently Asked Questions

The following is a list of frequently asked questions and situations you may encounter while using the AutoMARK to mark your ballot. The AutoMARK is designed to make marking your ballot as easy as possible.

Verify: Contact your election official for help if you encounter a situation that is not listed in this section.

Ballot is not Readable

Reasons:

- Ballot style is not used at this polling place.
- Ballot is damaged.

The AutoMARK displays the Error - Ballot Not Readable screen and ejects the ballot into the paper tray.

Error- Ballot Not Readable Screen

Remove your ballot from the paper tray and insert it again or contact an election official for assistance.

Ballot is Jammed

Reason:

- Ballot paper feed mechanism requires adjustment to feed your ballot into the AutoMARK

The AutoMARK displays the Error – Paper Misfeed screen and tries to eject your ballot. If successful, the Exit – Thank You screen appears; otherwise, the Error – Paper Misfeed screen remains.

Error- Paper Misfeed Screen

If your ballot is ejected, insert your ballot again.

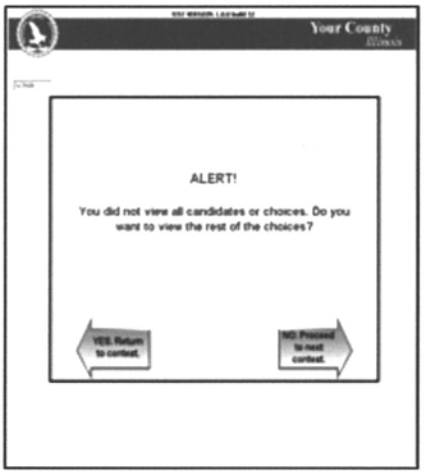
If your ballot is not ejected, contact your election official for assistance to retrieve your ballot.

Pop-up Screens

Pop-up screens display messages that require your response before you can continue marking, verifying, or printing your ballot selections.

The AutoMARK may display the following pop-up screens.

More Ballot Information Alert



The AutoMARK displays the More Alert pop-up screen when all candidates or choices cannot be seen without scrolling or you did not scroll down to view all choices and the word More was listed at the bottom of the list of candidates.

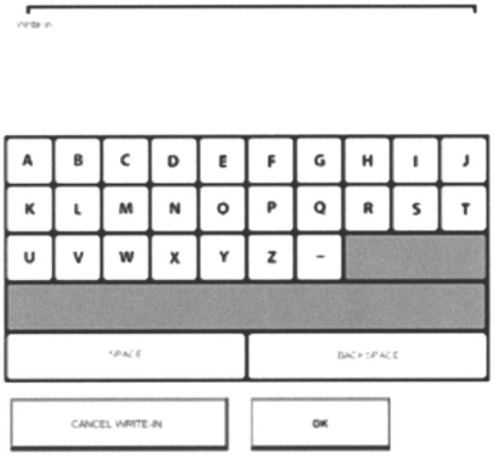
1. Touch the **YES** button to return to the current Contest screen and select MORE to review additional candidate names.
2. Touch the **NO** button to display the next screen.

Force More Alert

The AutoMARK displays the Force More Alert pop-up screen when all candidates or choices cannot be seen without scrolling or you did not scroll down to view all choices and the word "More" was listed at the bottom of the list of candidates. In this case, the system will not let you display the next screen until you have reviewed all candidates listed.

1. Touch the **OK** button to return to the current Contest screen and select MORE to review additional candidate names.

Write-in

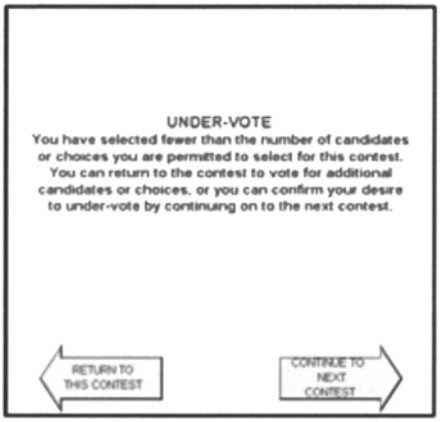


The AutoMARK displays the Write-In pop-up screen when you select the word "Write-In" (from the list of candidates for the contest) on a Contest screen.

1. If you do not want to write-in the name of a candidate, touch the **CANCEL** button. The AutoMARK clears any characters that may have been displayed in the write-in window, returns to the Contest screen and clears the oval next to the word Write-In.
2. If you want to write-in the name of a candidate, touch the letters, space and backspace images on the displayed keyboard to spell the name of the candidate you want to write in on your ballot. Then touch the **OK** button.

   As you touch a letter, space or backspace image, the AutoMARK displays the letters you have touched in the top write-in window on this screen. When the **OK** button is touched, the AutoMARK transfers the Write-In name to the list of candidates on the Contest screen; then selects the Write-In candidate name and fills the oval on the Contest screen.

Under-vote



The AutoMARK displays the Under-Vote pop-up screen when you did not select a candidate or choice, or made fewer selections than permitted for the contest on a Contest screen.

1. Touch the **RETURN TO CONTEST** button. The AutoMARK displays the Contest screen previously displayed.
2. Touch the **CONTINUE TO NEXT CONTEST** button. The next screen appears.

Over-vote

The AutoMARK displays the Over-Vote pop-up screen when you try to select more candidates or choices than are permitted for a particular contest.

1. Touch the **OK** button. The AutoMARK displays the Contest screen previously displayed.
2. If you wish to change your selections, you can deselect a previous choice by touching the name of the candidate. The AutoMARK deselects the candidates or choices and clears the oval. You can then select an alternate candidate or choice.

Straight Party Warning

The AutoMARK displays the Straight Party Selection screen when some candidates have been deselected by the voter but are being voted for anyway due to Straight Party rules.

1. Touch the **RETURN TO CONTEST** button. The Contest screen previously displayed appears.

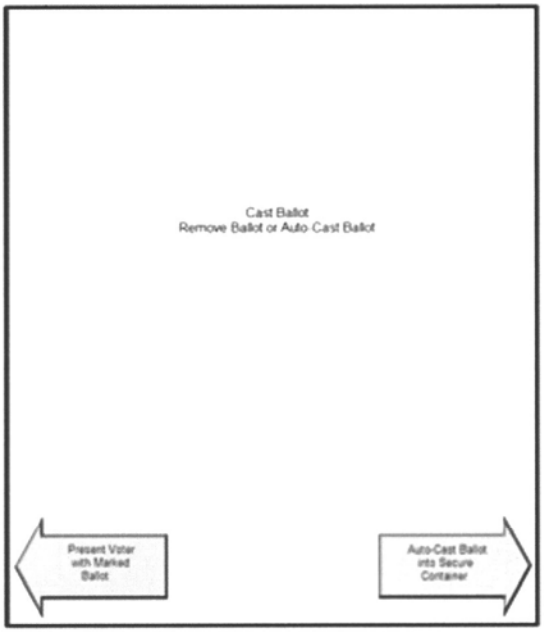
2. Touch the **CONTINUE TO NEXT CONTEST** button. The next screen appears.

Cross Endorsement Warning

The AutoMARK displays the Cross Endorsement warning screen (shown here) when an attempt is made to select the same candidate twice for the same race. This can occur if cross endorsement is handled by listing the same candidate more than once in a race.

1. Touch the **OK** button to return to the race.
2. To change the party endorsement of the candidate, deselect the candidate and reselect with the correct party affiliation.

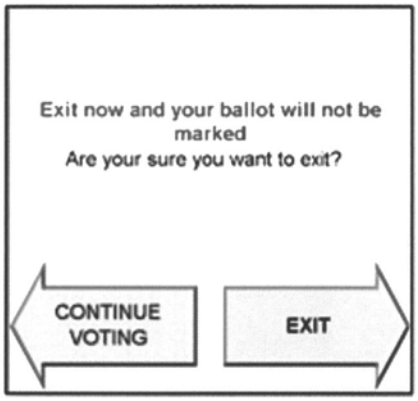
Rear Eject Voting Options



The AutoMARK displays the Rear Eject Option when Rear Eject functionality has been enabled. After marking the ballot, the voter is presented with a second summary screen that shows the scanned selections from the printed ballot. The voter is then given the choice to Auto-Cast the ballot out the rear of the unit or to be presented the ballot out the front.

1. Press **Auto-Cast Ballot into Secure Container** to eject the ballot out the rear paper tray.
2. Press the **Present Voter with Marked Ballot** to eject the ballot out the front slot.

Exit



The AutoMARK displays the Exit pop-up screen when you press **EXIT** before you have completed the voting process. Do one of the following:

- Press **CONTINUE VOTING** to return to continue the voting process.
- Press **EXIT** to exit the voting process and receive your unmarked ballot.

Exit Thank You

The AutoMARK displays the EXIT Thank You screen and ejects your unmarked ballot into the paper tray.

- Remove your unmarked ballot from the paper tray.

  The **Insert Your Ballot** screen appears when you remove the ballot.

To exit without marking the ballot, you can press BACK repeatedly, or you can press SCREEN four times in a row.

Chapter 11: Maintenance

This chapter provides information on maintaining the AutoMARK between elections. It also describes procedures that are completed in the TEST MODE, by an authorized Jurisdiction Official.

Before storing the AutoMARK you must complete the following steps:

1. Remove the printer cartridge.
2. Charge the battery.
3. Clean the AutoMARK.
4. Store the AutoMARK.

The following paragraphs provide more information about these steps.

Remove the Printer Cartridge

Always remove the used printer cartridge from the AutoMARK and discard it before storing the AutoMARK between elections. Spare printer cartridges should be purchased prior to the next election and stored separately from the AutoMARK.

Contact ES&S to purchase the following approved printer cartridges.

- Part number 87002 (Non IR)
- Part number 87003 (IR)

Reference: See the Install a New Printer Cartridge heading in Chapter 5: AutoMARK Setup Instructions for information about installing the printer cartridge.

Charge the Battery

Between elections and in order to be ready for the next election, you must always charge the battery on the AutoMARK.

Reference: See the Charge the Battery (If Installed) heading in Chapter 5: AutoMARK Setup Instructions for information about how to charge the battery.

Clean the AutoMARK

Before storing the AutoMARK use alcohol wipes to clean the outside panels of the AutoMARK unit.

Store the AutoMARK

The AutoMARK is designed for storage and operation in any enclosed facility ordinarily used as a warehouse or polling place. During operation, facility temperature range should be 50^0 F to 104^0 F and moisture range should be 10% to 50% relative humidity. For storage, facility temperature range should be -4^0 F to 140^0 F and moisture range should be 10% to 85% relative humidity.

Test Mode Maintenance Procedures

The following procedures are performed with the key inserted, while the AutoMARK is in TEST MODE, and must be performed by an authorized election official.

Print the Operation Log (System Log File)

The Operation Log is used to view all signification operations that have occurred on the unit. The log entries are stored in a circular buffer on the flash card which will hold the most recent 277,777 entries.

Following is an example of entries that might appear in the Operation Log.

(1142)	11/10/2004	13:29:19	Aborted Marking Ballot ID: 1
(1141)	11/10/2004	13:20:12	Ballot Marked Ballot ID: 1
(1140)	11/10/2004	13:19:47	Ballot Marked Ballot ID: 1
(1139)	11/10/2004	13:17:07	Unrecognized Ballot
(1138)	11/10/2004	13:16:55	System Powered On Serial Number 000015
(1137)	11/10/2004	13:15:46	Keyswitch Run Mode
(1136)	11/10/2004	13:15:01	Test Print Ballot ID: 1
(1135)	11/10/2004	13:14:50	Keyswitch Test Mode
(1134)	11/10/2004	13:14:00	Hour Print Report Total Printed: 102
(1133)	11/10/2004	13:14:00	System Powered On Serial Number 000015

The Operation Log information is stored on the Flash Card. If you insert a different flash card from the original one in the system, the data contained in the Operation log will also change. Before using a flash card on a different system, be sure to erase the entire contents of the flash card so that system-oriented files, such as the Operation Log information, are deleted.

The Poll ID is not included in the Operation Log when all ballot styles are included on the card. If required by your jurisdiction, manual procedures can supplement the audit log to indicate from which polling place the specific audit log came.

Take the following steps to print the Operation Log.

1. Enter the Test Mode screen by turning the key switch to **Test**.
2. The **AutoMARK Main Menu** Screen will display
3. Press the **Operations Log** button. A text box with the operations log inside it displays.

The Operations Log does not contain entries related to the printing of the log.

4. Press the **Up** button to scroll one screen up, or press the **Down** button to scroll one screen down. Or, you can advance the display to show a particular page by touching the text box under "Go to page:". A number keypad appear. Press the numbers for the page you wish to display.
5. To print this log on completely blank ballot stock paper, press the **Print** button. The screen displays *Insert blank paper.* (Ballot stock is between 80 and 110 pound index stock. Ballot stock is slightly heavier than normal paper and less likely to jam.)
6. Insert a sheet of completely blank ballot stock paper.
7. After inserting the paper, the unit automatically begins printing the operation log, 66 lines per page. If there are more than 132 entries in the operation log, you will need several pages.
8. After the page has been ejected from the unit, if the message *insert another blank sheet of paper* appears, insert another page. Repeat this process until the message *printing done* appears.

If the message "Print Failure" appears, there is paper still in the VAT, and you are unable to exit the screen, turn the key to OFF, then turn the key to TEST and press Eject Ballot. This will eject the page on which the print failure occurred.

9. Exit Test Mode by turning the key switch.

The following is a list of possible Operation Log entries:

System Powered On

Serial Number xxxxxx Build xxx

This entry indicates the system was powered on, and gives the Serial Number and Build number.

System Shutdown OK

This entry indicates the system was shut down using the key switch.

Keyswitch Test Mode

This entry indicates the key switch was used to enter test mode.

Keyswitch Run Mode

This entry indicates the key switch was used to enter run mode.

Hour Print Report

Total Printed: XXX

This entry is added when the unit is booted and once per hour during normal operation. It lists the total number of ballots printed on the VAT (lifetime count).

Printer Calibration

X=XXX
Y=XXX
Angle=XXX

This entry indicates that the printer has been calibrated through the Test Mode Printer Calibration feature, and gives the X, Y, and Angle settings made.

Unrecognized Ballot

This entry indicates that an unrecognizable ballot was inserted.

Ballot Marked Successful

This entry indicates that a ballot was printed.

Ballot Returned Unmarked

This entry indicates that a ballot was inserted, but ejected before it was printed.

Test Print Successful

This entry indicates that a ballot was printed using the Test Print feature of Test Mode.

Printer Malfunction

Failed to Verify
Paper Jam
Paper Too Short

This entry indicates that there was a printer malfunction, and the reason.

Printer Low On Ink

This entry indicates that the printer is running low on ink.

Printer Ink Used Up

This entry indicates that the printer cartridge should be immediately changed.

Scanner Malfunction

Top Scanner
Bottom Scanner
PV Scanner
Scanners/PEB

This entry indicates that there was a scanner malfunction, and indicates which scanner was involved.

Paper Misfeed

This entry indicates that the ballot was not inserted correctly.

No Election Data

This entry indicates that no election data was found.

CF Card Access Failure

This entry indicates that the system was unable to read the data on the compact flash memory card.

Loaded Ballot Id xxxx

This entry indicates that election data for a specified ballot was loaded.

Marked Ballot Inserted

This entry indicates that a ballot which has already been marked was inserted into the VAT.

Unit Locked Time Out

This entry indicates that the user (voter) did not take action within a preset amount of time.

Battery Low

This entry indicates that the battery power is low – the VAT will need to be plugged in soon to charge the battery.

Running on Battery Power

This entry indicates that the VAT is using battery for its power source.

Running on External Power

This entry indicates that the VAT is using external electrical power source.

Login Successful

This entry indicates that a user logged in successfully.

Login Failure

This entry indicates that a login was attempted, but was not successful.

Date/Time Change

This entry indicates that the current date and time was re-set.

Battery Charged

This entry indicates that the battery was charged.

Eject Ballot From Test Mode

This entry indicates that the ballot was ejected from the Test Mode screen.

Test Print Screen

Entered
Exited

This entry indicates that the user entered/ exited the Test Print screen (from Test Mode).

Service Printer Cartridge Screen

Entered
Exited

This entry indicates that the user entered/ exited the Service Print Cartridge screen.

Manual Print Calibration Screen

Entered
Exited

This entry indicates that the user entered/ exited the Print Calibration screen.

View Operation Log Screen

Entered
Exited

This entry indicates that the user entered/ exited the Operation Log Screen.

Battery Status Screen

Entered
Exited

This entry indicates that the user entered/ exited the Battery Status screen.

Software Versions Screen

Entered
Exited

This entry indicates that the user entered/ exited the Software Versions screen

Calibrate Touch Screen

Entered
Exited

This entry indicates that the user entered / exited the Calibrate Touch Screen.

Unlock Flash Card Screen

Entered
Exited

This entry indicates that the user entered/ exited the Unlock Flash Card screen.

View Scan/Service Log Screen

Entered
Exited

This entry indicates that the user entered/ exited the View Scan/Service Log screen.

Upload Firmware Screen

Entered
Exited

This entry indicates that the user entered/ exited the Upload Firmware screen.

Set Security Screen

Entered
Exited

This entry indicates that the user entered/ exited the Set Security screen.

Set Date/Time Screen

Entered
Exited

This entry indicates that the user entered/ exited the Set Date/Time screen.

Set Print Head Screen

Entered
Exited

This entry indicates that the user entered/ exited the Set Print Head screen

Loaded Election xxxxxxxxxxxx

This entry indicates that the user loaded a new election (actually puts string in operation log with election title (UNICODE) max 39 characters displayed).

Print Head Missing

This entry indicates that the print head was not found.

Unknown Operation

This entry should never appear – it means that the Operation Log file has been corrupted.

Scanner Intensity Measurements

This entry records the calibration values being used by the scanners.

Print the Scan Log or Service Log

These log files record scanner error events and service events. To view or print either of these logs,

1. Enter the Test Mode screen by turning the key switch to **Test**.
2. The **AutoMARK Main Menu** Screen will display
3. Select Maintenance Menu.

4. Enter the system security code.

Depending on the security strength, the security code can range from 4-16 characters in length, and be comprised of numbers, the '-' symbol, and upper and lower case letters. The screen will display * symbols when you enter the security code.

The security code is dependent upon the security code strength set in ElectionWare. Refer to Chapter 12: Set Security Strength of the *ES&S ElectionWare System Operations Procedures* manual for more information regarding security code strength and how the strength affects the combination of characters in the security code.

5. Select Scan Log, or Service Log.
6. To print the log, follow the steps as for printing the Operation Log (as described under the Print the Operation Log (System Log File) heading).

The following is a list of possible Scan Log entries.

TopOfPage(TOP): not found

ScannerPrinterLibrary.DLL logs this when the top of the ballot from the top scanner could not be found.

BottomOfPage(TOP): not found

ScannerPrinterLibrary.DLL logs this when the bottom of the ballot from the top scanner could not be found.

TopOfPage(BOTTOM): not found

ScannerPrinterLibrary.DLL logs this when the top of the ballot from the bottom scanner could not be found.

BottomOfPage(BOTTOM): not found

ScannerPrinterLibrary.DLL logs this when the bottom of the ballot for the bottom scanner could not be found.

Noise on top scan image

ScannerPrinterLibrary.DLL logs this when the top scanner image has a lot of noise.

Could not create ScanPVDoneEvent!

ScannerPrinterLibrary.DLL logs this when the event could not be created.

TopOfPage(PV): not found.

ScannerPrinterLibrary.DLL logs this when the top of the page for the PV scanner could not be found.

BottomOfPage(PV): not found.

ScannerPrinterLibrary.DLL logs this when the bottom of the page for the PV scanner could not be found.

Didn't detect alignment marks.

ScannerPrinterLibrary.DLL logs this when alignment marks could not be found.

Error in PV scan/ballot edge.

ScannerPrinterLibrary.DLL logs this when the edge of the ballot is at a much different angle than the timing marks along that edge.

Optech: no front columns defined

ScannerPrinterLibrary.DLL logs this when no columns have been defined on the front for Optech ballots.

Optech: no back columns defined

ScannerPrinterLibrary.DLL logs this when no columns have been defined on the back for Optech ballots.

Bad angle on trailing edge.

ScannerPrinterLibrary.DLL logs this when detected angle of bottom of ballot has a problem.

Optech: no data found in cols selected

ScannerPrinterLibrary.DLL logs this when the scanned ballot doesn't match the definition.

Optech scan/definition mismatch.

ScannerPrinterLibrary.DLL logs this when the scanned ballot doesn't match the definition.

Ballot scan/definition error bottom side.

ScannerPrinterLibrary.DLL logs this when the defined ballot doesn't match the scan.

Ballot scan/definition error top side.

ScannerPrinterLibrary.DLL logs this when the defined ballot doesn't match the scan.

Arrow count mismatch on back.

ScannerPrinterLibrary.DLL logs this when more or less arrows were detected on the back.

Arrow count mismatch on front.

ScannerPrinterLibrary.DLL logs this when more or less arrows were detected on the front.

Excessive PV rotation.

ScannerPrinterLibrary.DLL logs this when the ballot has rotated an excessive amount in the print zone.

TopOfPage(SHORT PV): not found.

ScannerPrinterLibrary.DLL logs this when the top of the ballot could not be found in the short PV scan.

Short PV Scan Truncation.

ScannerPrinterLibrary.DLL logs this when the top of the ballot in the short PV scan occurs immediately.

Did not detect ref mark in short pv.

ScannerPrinterLibrary.DLL logs this when the reference mark in the front scan cannot be found in the proper region of the short PV scan.

Illegal front ref point!

ScannerPrinterLibrary.DLL logs this when the front reference point is illegal.

Illegal back ref point!

ScannerPrinterLibrary.DLL logs this when the back reference point is illegal.

Warning: PV Scan Failed!

ScannerPrinterLibrary.DLL logs this when the short PV scan could not be recognized.

SCD_GetScanData(SHORT_PV) returned FALSE

ScannerPrinterLibrary.DLL logs this when SCANDRIVER.DLL has had a failure.

GETMARKS: X timing mark X array NULL!

ScannerPrinterLibrary.DLL logs this when GETMARKS.DLL has had a failure.

GETMARKS: X timing mark Y array NULL!

ScannerPrinterLibrary.DLL logs this when GETMARKS.DLL has had a failure.

Should be ... X front marks but ... found.

ScannerPrinterLibrary.DLL logs this when there is a mismatch in the expected number of X timing marks and the detected number of X timing marks.

Should be ... X back marks but ... found.

ScannerPrinterLibrary.DLL logs this when there is a mismatch in the expected number of X timing marks and the detected number of X timing marks.

Top Scan Truncation.

ScannerPrinterLibrary.DLL logs this when the top of the ballot appears at the top of the top scan.

Bottom Scan Truncation.

ScannerPrinterLibrary.DLL logs this when the top of the ballot appears at the top of the bottom scan.

Could not find bottom of back scan.

ScannerPrinterLibrary.DLL logs this when could not find the bottom of ballot in the bottom scan.

Too long Optech stub/margin back bottom!

ScannerPrinterLibrary.DLL logs this when it was detected that the ballot has a longer stub than the stub setting allows (or that the ballot has a stub that should not be there).

Illegal back_max_row_Y.

ScannerPrinterLibrary.DLL logs this when an illegal variable is calculated.

Did not detect any Y marks

ScannerPrinterLibrary.DLL logs this when no vertical timing marks could be detected.

Didn't detect marks in short PV scan.

ScannerPrinterLibrary.DLL logs this when no timing marks were found in short PV scan.

BOTTOM SCANNER: no data!

ScannerPrinterLibrary.DLL logs this when the bottom scanner never detected top of form.

Optech vote locations count mismatch

ScannerPrinterLibrary.DLL logs this when more or less arrows were found than the definition calls for.

TOP SCANNER: no data!

ScannerPrinterLibrary.DLL logs this when the top scanner never detected top of form.

Too long Optech stub/margin top side bottom!

ScannerPrinterLibrary.DLL logs this when it was detected that the stub length is not large enough to support the stub on the top scan bottom of the ballot (or that the ballot has a stub that should not be there).

Illegal front_max_row_Y.

ScannerPrinterLibrary.DLL logs this when an illegal variable was calculated.

Bad front top scan.

ScannerPrinterLibrary.DLL logs this when the top scanner image was not recognized.

Bad front bottom scan.

ScannerPrinterLibrary.DLL logs this when the bottom scanner image was not recognized.

Bad short PV scan.

ScannerPrinterLibrary.DLL logs this when the short PV scan image did not detect any marks.

Errant GetOvals call!

ScannerPrinterLibrary.DLL logs this when GetOvals was called without GetStyleKeys being called.

Missed vertical timing marks!

ScannerPrinterLibrary.DLL logs this when it was detected that vertical timing marks were missed being detected.

CreateEvent TopDone Failed!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

CreateEvent TopStart Failed!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

Create Event BotDone Failed!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

Create Event PVDone Failed!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

Create Event ShPVDone Failed!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

Could not create ScanTopDoneEvent!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

Could not create ScanBottomDoneEvent!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

Could not create ScanPVDoneEvent!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

Could not create ScanShortPVDoneEvent!

ScannerPrinterLibrary.DLL logs this when an event could not be created.

Stub setting too low!

ScannerPrinterLibrary.DLL logs this when it was detected the stub setting is too low for this ballot (or that the ballot has a stub that should not be there).

GSK2: an arg is NULL!

ScannerPrinterLibrary.DLL logs this when an argument to GetStyleKeys was NULL from AutoMARK.DLL.

Both sides unrecognized!

ScannerPrinterLibrary.DLL logs this when neither side of the ballot could be recognized.

GETMARKS: GetTimingMarks front error #....

ScannerPrinterLibrary.DLL logs this when GETMARKS.DLL routine GetTimingMarks encounters a scan error on the top scan.

GETMARKS: GetTimingMarks back error #....

ScannerPrinterLibrary.DLL logs this when GETMARKS.DLL routine GetTimingMarks encounters a scan error on the bottom scan.

GETMARKS: GetTimingMarks PV error #....

ScannerPrinterLibrary.DLL logs this when GETMARKS.DLL routine GetTimingMarks encounters a scan error on the PV scan.

GETMARKS: GetTimingMarks UNKSCN error #....

ScannerPrinterLibrary.DLL logs this when GETMARKS.DLL routine GetTimingMarks encounters a scan error on an unknown scanner.

Truncation error on scanner ...

AutoMARK.DLL and SCANDRIVER.DLL detected the top of the ballot started immediately or before scanning begun.

Overflow error on scanner ...

AutoMARK.DLL detected that SCANDRIVER.DLL was not quick enough in getting data from the DSP RAM and scan data was lost.

Scanner Timeout!

AutoMARK.DLL detected all scanners timed out acquiring data and end of data.

The following is a list of possible Service Log entries:

Failed to allocate slopetop

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

Out of memory alloc ....

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

Out of memory allocating ....

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

PVAngle: Failed to allocate slopetop.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

PVAngle: Failed to allocate scanline.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

Very Short Short PV Scan

SCANNERPRINTERLIBRARY.DLL logs this when short PV scan is impossibly short.

Failed to read EEPROM (print cal)

SCANNERPRINTERLIBRARY.DLL logs this when could not read NV EEPROM.

Math error placing Y mark

SCANNERPRINTERLIBRARY.DLL logs this when a math / algorithmic error was made.

Out of memory ...

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

NULL args to RetrieveBottomPos

SCANNERPRINTERLIBRARY.DLL logs this when a routine call was misused.

NULL args to RetrieveTopPos

SCANNERPRINTERLIBRARY.DLL logs this when a routine call was misused.

Scandriver DLL not initialized!

SCANNERPRINTERLIBRARY.DLL logs this when SCANDRIVER DLL is not present.

Printer board failed to respond!

SCANNERPRINTERLIBRARY.DLL logs this when the PEB fails to respond to a command.

DiagnosticLogger.DLL failed to init.

SCANNERPRINTERLIBRARY.DLL logs this when DIAGNOSTICLOGGER.DLL could not initialize.

DiagnosticLogger.DLL inconsistent.

SCANNERPRINTERLIBRARY.DLL logs this when DIAGNOSTICLOGGER.DLL is inconsistent.

GETMARKS.DLL not found.

SCANNERPRINTERLIBRARY.DLL logs this when GETMARKS.DLL was missing.

GETMARKS.DLL inconsistent.

SCANNERPRINTERLIBRARY.DLL logs this when GETMARKS.DLL was inconsistent.

Scandriver DLL not found.

SCANNERPRINTERLIBRARY.DLL logs this when SCANDRIVER.DLL was missing.

Scandriver DLL inconsistent!

SCANNERPRINTERLIBRARY.DLL logs this when SCANDRIVER.DLL was inconsistent.

Error: scandriver DLL unloaded.

SCANNERPRINTERLIBRARY.DLL logs this when SCANDRIVER.DLL was not loaded.

NonVolatileLibrary DLL not found.

SCANNERPRINTERLIBRARY.DLL logs this when NONVOLATILELIBRARY.DLL was missing.

NonVolatileLibrary DLL inconsistent!

SCANNERPRINTERLIBRARY.DLL logs this when NONVOLATILELIBRARY.DLL was inconsistent.

OperationLogger DLL not found.

SCANNERPRINTERLIBRARY.DLL logs this when OPERATIONLOGGER.DLL was missing.

OperationLogger DLL inconsistent!

SCANNERPRINTERLIBRARY.DLL logs this when OPERATIONLOGGER.DLL was inconsistent.

SCD_SetBubble failed for Optech bubble.

SCANNERPRINTERLIBRARY.DLL logs this when PEB fails to recognize new bitmap command.

GETMARKS:InitScan error #....

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

Xcoltmxcolpos memory alloc failed.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

Mismatch in printer Y coord!

SCANNERPRINTERLIBRARY.DLL logs this when a math / algorithmic error occurred.

AddTimingMark (x) ... of ... alloc.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

.... Exception

SCANNERPRINTERLIBRARY.DLL logs this when a low-level C/C++ DLL had an exception error.

NULL optechstruct arg!

SCANNERPRINTERLIBRARY.DLL logs this when a call to GETMARKS was misused.

NULL essstruct arg!

SCANNERPRINTERLIBRARY.DLL logs this when a call to GETMARKS was misused.

Arg optechstruct is NULL!

SCANNERPRINTERLIBRARY.DLL logs this when a call to GETMARKS was misused.

Arg essstruct is NULL!

SCANNERPRINTERLIBRARY.DLL logs this when a call to GETMARKS was misused.

Could not access thresholds data!

SCANNERPRINTERLIBRARY.DLL logs this when the thresholds RAM file could not be accessed.

Alloc temp scan buf 0 ptrs ... lines failed.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

Alloc frontbuf failed.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

Alloc backbuf failed.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

GetOvals:128byte alloc error.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

PVAngle: Failed to allocate slopetop.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

logstr out of memory.

SCANNERPRINTERLIBRARY.DLL logs this when a memory allocation error occurred.

Unable to Set Abort Get Ovals Event.

SCANNERPRINTERLIBRARY.DLL logs this when unable to start an event.

No scanner image saved.

SCANNERPRINTERLIBRARY.DLL logs this when SCANDRIVER.DLL failed to store a RAM file bitmap.

Could not open I2C port

NONVOLATILELIBRARY.DLL logs this when the I2C OS resource could not be opened.

Read I2C Error ...

NONVOLATILELIBRARY.DLL logs this during an I2C NV EEPROM read error.

Could not get EEPROM data!

NONVOLATILELIBRARY.DLL logs this during an NV EEPROM read error.

Could not put EEPROM data!

NONVOLATILELIBRARY.DLL logs this during an NV EEPROM write error.

Bad CRC32 in Bank ... of EEPROM

Indicates corruption in one of the NV EEPROM banks. Here are the meanings of the bank numbers:

bank 2: ballot type, scanner calibration data
bank 3: maintenance security code
bank 4: unlock code, printer angle calibrations
bank 5: manufacturer's data
bank 6: firmware revision, hardware revision
bank 7: print count, dot count, printer calibrations, serial number

Operation Log Corrupt!

AutoMARK.DLL logs this when OPERATIONLOGGER.DLL detects that the OP.ELF file on the Flash Memory Card is corrupted.

Write-in length error.

AutoMARK.EXE logs this if the value specified in AIM's for write-in length caused an illegal value to be computed in the GUI.

...Exception

AutoMARK.EXE logs this when an exception occurs of the specified type.

ERROR: ....

AutoMARK.EXE logs this when an exception occurs in the managed code.

Error preparing audio for play.

AutoMARK.EXE error occurred in the WAV file handler or waveOut... OS API.

Could not allocate pinned WAV header.

AutoMARK.EXE failed in call to GCHandle.Alloc in WAV file handler.

Error waiting for audio ready.

AutoMARK.EXE encountered an error waiting for a WAV file thread to terminate in WAV file handler.

Faulty Sound Driver - Reformat Drive.

AutoMARK.EXE has detected that the OS sound driver has become corrupted. The NOR flash drive must be reformatted.

Error preparing new audio.

AutoMARK.EXE encountered an error preparing new audio in the WAV file handler.

Error escaping WAV windows routine.

AutoMARK.EXE encountered a time-out error in the WAV file handler.

Error waiting audio done cleanup.

AutoMARK.EXE encountered a time-out error in the WAV file handler.

Error playing audio.

AutoMARK.EXE encountered a time-out error in the WAV file handler.

Error waiting for audio windows exit.

AutoMARK.EXE encountered a time-out error in the WAV file handler.

Error waiting for audio done.

AutoMARK.EXE encountered an error waiting for a WAV file thread to terminate in WAV file handler.

Unable to initialize speech engine.

AutoMARK.EXE encountered a problem initializing the Eloquence text-to-speech engine. The library files may have become unregistered or the engine may have been terminated improperly.

Dictionary load error. LangId=...

AutoMARK.EXE encountered a problem loading a dictionary from the storage card election data folder.

Set the Maintenance Security Code

You can change the Maintenance Security Code to keep the unit secure. Unauthorized users of the AutoMARK unit cannot reprogram the module, set the system date and time, or perform other Administrator tasks without knowing the Maintenance Security Code.

The security code must be 8-16 characters in length, comprised of numbers, the - symbol, and upper and lower case letters. The screen will display * symbols when you enter the security code.

Take the following steps to set the Maintenance Security Code.

1. Enter the Test Mode screen by turning the key switch to Test.
2. The **AutoMARK Main Menu** screen will display
3. Press **System Maintenance**.
4. You will be prompted to enter a security code. Enter the current Maintenance Security Code
5. The **System Maintenance Menu** will be displayed

6. Press the **Set Maintenance Security Code** button.
7. Re-enter the Maintenance Security Code on the next screen. Press **Done/Enter** when you have entered this old security code.
8. Enter the new security code. Press **Done/Enter** when you are done.
9. Confirm that the screen shows the message indicating that the New Security Code was successfully saved.
10. Make sure to write down the new security code in at least one location so that the security code is not forgotten!
11. Move the key switch out of test position.

Set the Date and Time

You can set the date and time that the AutoMARK uses for logging operations in the various operations and diagnostic logs. Take the following steps to set the date and time.

1. Enter the Test Mode screen by turning the key switch to **Test**. (A Flash Memory Card must be present to open Test Mode.)
2. The **AutoMARK Main Menu** screen will display
3. Press **System Maintenance**.
4. Enter the system security code.

Note: The security code is 8-16 characters in length, comprised of numbers, the - symbol, and upper and lower case letters. The screen will display * symbols when you enter the security code.

5. Press **Set Date/Time**.
6. Press on the button next to either **Date** or **Time** to change either Date or Time.
7. Press **CLEAR**.
8. Enter the new values on the touch screen keypad according to the following time and date formats:
   Time: HH-MM-AM (The system accepts either 24-hour and 12-hour (AM/PM) entries. If PM is left off, the entry defaults to AM.)

   Date: MM-DD-YY

Note: Ensure that you check the accuracy of your time and date entries before leaving this screen to avoid printing or testing errors.

9. Press **Apply** to store the settings.

10. Press **Done** when you are done editing the date and time.
11. Move the key switch out of test position.

Calibrate the Touch Screen

Calibrate the touch screen if you feel the spots that you are pressing on the touch screen are not the same spots that AutoMARK recognizes For example, if it feels like you have to press too high or too low or too far to the left or too far to the right to get to a certain button, then you need to re-calibrate the touch screen. Take the following steps to calibrate the touch screen.

1. Enter the Test Mode screen by turning the key switch to **Test**.
2. The **AutoMARK Main Menu** screen will appear.
3. Press **Calibrate Touch Screen**.
4. Press **Calibrate**.
5. Follow the on-screen instructions by touching the points on the screen that the screen indicates.
6. Press on the screen again when finished.
7. Press **Done** after you are finished calibrating. If you skip this step, the settings may not be remembered when the system is re-booted.

Calibrate the Printer

Note: This procedure is used to calibrate the unit whenever there is a significant rotation or consistent X or Y offset during normal printing operations.

There are two screens used to calibrate the printer.

- Manual Printer Calibration Utility
- Automatic Printer Calibration

Manual Printer Calibration Utility

The Manual Printer Calibration Utility screen is used to enter calibration adjustments manually. Begin the calibration process here. Take the following steps to access the Manual Printer Calibration Utility.

1. Enter the Test Mode screen by turning the key switch to **Test**.
2. The **AutoMARK Main Menu** Screen will display.
3. Press **Printer Calibration**.
4. To begin calibration, enter -18 for X and 21 for Y. This is a good "first guess" that will get you in the neighborhood for DV3.0 and DV3.5 units. (Leave the angle calibrations at 0.)
5. Press **Save Values**.
6. Press **DONE**.
7. Then go to the Automatic Printer Calibration screen described in the following paragraphs.

Automatic Printer Calibration

Reference: See the Manual Printer Calibration Utilityin this chapter for further information on manually calibrating the printer.

For automatic printer calibration use Election Data and paper ballots that have oval targets and oval density of 3 ovals per inch or less. For best results ballots should also have oval locations and timing marks on both sides and should be inserted first page up, front first.

The AutoMARK implements an automatic printer calibration function that is accessible from the Test Ballot Print feature of Test Mode and may be used with any AutoMARK compatible ballot.

1. Enter the Test Mode screen by turning the key switch to **Test**.
2. The **AutoMARK Main Menu** Screen will appear.
3. Press **Test Ballot Print**.
4. Select the **Enable Calibration Suggestions** checkbox in the center top of the screen.
5. If using an ballot style with a removable stub, remove the stub before inserting the ballot.

6. Insert a ballot compatible with the currently installed Flash Memory Card. For best results, ballot should have oval locations, timing marks on both sides, and should be inserted first page up, front first.
7. After printing, the system will provide feedback based on the print accuracy and will prompt the user whether or not to implement the new settings.
8. If the marks are consistently off in two directions on the front and the two opposite directions on the back, select **yes** to accept the new settings.
9. If the printing is accurate enough, and the suggestion is just a couple units here and there, you might want to select **no**, and deem that it is calibrated enough (assuming all the marks are perfectly accurate except for a miniscule amount of rotation or offset that is not symmetrical with the back side).
10. Insert another ballot compatible with the currently installed FMC.
11. After the ballot prints, examine it for print accuracy. If additional refinement is desired, repeat the process from step 7 until the accuracy is acceptable.
12. When the print accuracy is finalized, press **no** when prompted to accept the new settings.
13. Press **done.**
14. Exit Test Mode by turning the key switch to the ON position.

It usually takes about four test prints to fully calibrate the printer using the Automatic Printer Calibration suggestions. You can use the Manual Printer Calibration Utility to adjust the calibration once you get used to making the adjustments. The Manual Printer Calibration Utility should rarely be used, except for the initial "preset" to -18, 21, and also if you already know a particular unit's calibrations (such as if the unit's SBC was replaced or if software was re-installed from scratch). In these cases, you could enter them directly and bypass the Auto print calibration procedure.

Print calibrations are logged in the Operation Log, so that if a unit loses its calibrations (due to changing SBC, re-installing software, or someone tampered with them) you can go through the Operation Log and pick the values from the Operation Log to use in the Manual settings screen. (This assumes you are using the same Flash Memory Card as was used when the printer was calibrated successfully the first time.)

Reference: See the Print the Operation Log (System Log File) heading in this chapter for information about the Operation Log.

Polling Place Information

To check the polling place information contained on the flash card, use the Test menu option, **Poll Place Info**. Use the following steps to display the Poll Place information.

1. Turn the key switch to the **Test** position.
2. When prompted, enter the Election Security Code specified in ElectionWare.
3. When the screen appears, press the button labeled **Poll Place Info**. The polling place information attributed to that card appears on the screen.

More System Maintenance Procedures

Reference: See the *AutoMARK ESS Systems Maintenance Manual AQS-14-5010-001-F* for more information on procedures for providing technical support, system maintenance and correction of defects, and for incorporating hardware upgrades and new software releases.

Chapter 12: Troubleshooting

This chapter contains common troubleshooting procedures and a description of error messages.

Verify: Contact a Jurisdiction Official if you have a problem that is not described in this chapter.

Clear a Paper Jam

Note: If using ballots with removable stubs, remove the stub before inserting the ballot into the VAT.

Take the following steps to clear a paper jam. These steps apply regardless of where the voter is in the voting process.

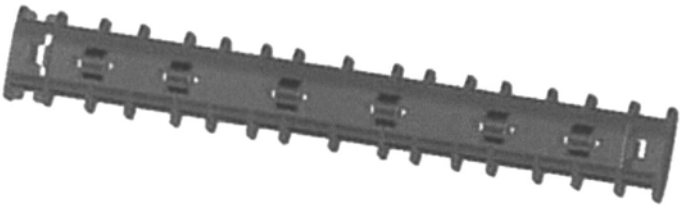
1. Turn the key to **TEST** mode. The Main Menu will appear.
2. Attempt to eject the ballot automatically by selecting **Eject Ballot**.
3. If the ballot does not come out using the automatic ejection option, open the top panel or the rear clean-out panel. The top cleanout tray can be removed by pushing in on the round tabs at the sides of the tray and lifting. The rear panel can be removed by pulling tab sideways and out.
4. Remove the ballot.
5. Switch the key to **ON** mode.
6. If ballot is not damaged, not folded in any way, and not marked, re-insert the ballot correctly.
7. The voter may begin to vote.

If the unit repeatedly jams, make sure the cleanout tray has the reversible roller in the proper position. The reversible roller needs to be wheels-down for 3"-14" ballots and wheels-up (into the cleanout tray) for 15"-22" ballots. Also make sure the cleanout tray is pressed down firmly so that tabs on both sides are properly fastened in the corresponding slots.

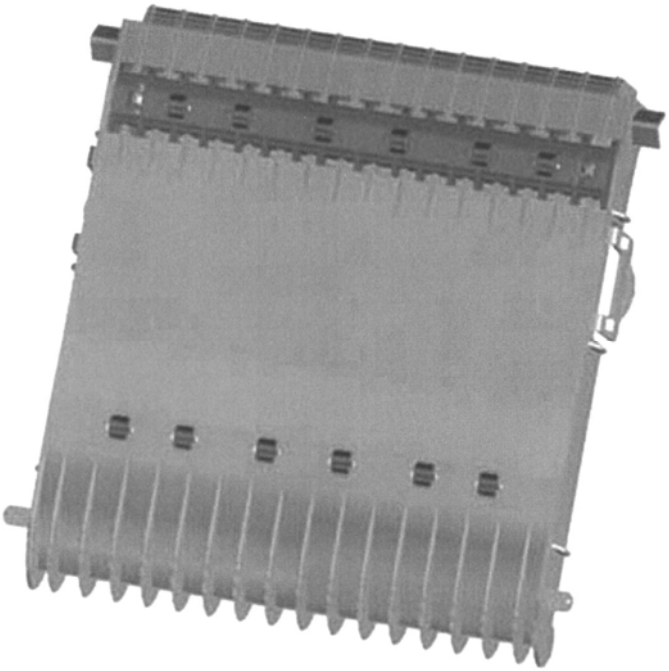
Reversible Roller Guide and Ballot Size

A Reversible Roller Guide allows the AutoMARK unit to be configured for various ballot lengths. It must be configured appropriately to prevent paper jams. The Reversible Roller Guide is located in the Top Cleanout.

Reversible Roller Guide



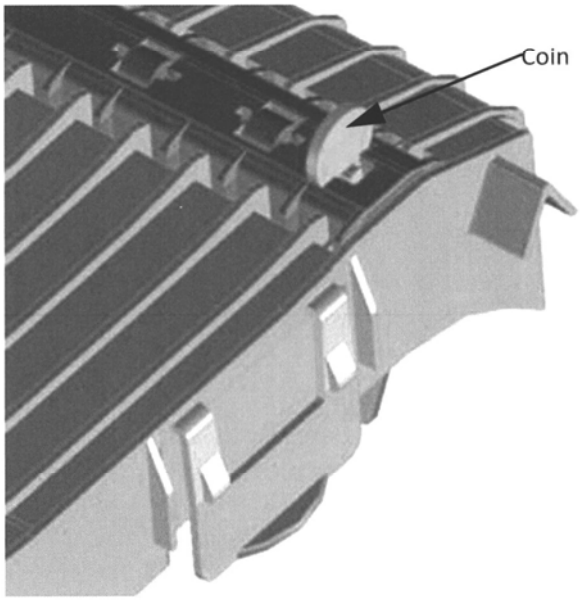
Reversible Roller Guide Installed in Top Cleanout (Shown in standard ballot configuration)



Roller Guide and Ballot Size

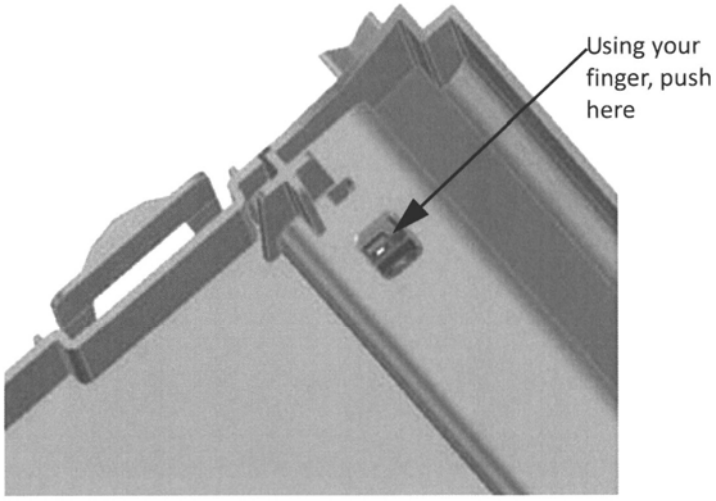
Ballot Size	Position of Reversible Roller
under 15 inches	Reversible roller nip active (roller wheels down)
15 inches or more	Reversible roller nip inactive (roller wheels up)

To accommodate long ballots (15” or more), the reversible roller guide must be flipped over so that the black plastic rollers are not exposed. To complete this operation, insert a coin into one of the slots on the Reversible Roller Guide.



Remove the Roller Guide

Locate small rectangular window on Top Cleanout opposite to where the coin is inserted. Insert your finger through the window, press on the coin, and push out the Reversible Roller Guide. Repeat removal process for other end of the Reversible Roller Guide and remove the coin when finished.



Reverse the Roller Guide

Once the Reversible Roller Guide has been removed it may be flipped over so that the rollers are hidden for long ballots, or installed such that the rollers are exposed for short ballots.

Flash Memory Card Errors

The following procedures are used if you receive a flashcard error.

Unlock the Flash Memory Card

You may need to unlock the flash card to set a new pin. Take the following steps to unlock the flash card and set a new pin.

1. Turn the key switch to the TEST position. Confirm that the AutoMARK Main Menu appears.
2. Select **Unlock Flash Card**.
3. Enter the correct PIN number for the compact flash memory card by pressing the white box for the unlock code and typing the numbers on the touch screen keypad that appears, then press **DONE**.
4. Press **Unlock** when you finish typing the correct PIN number. If the PIN number was correct and the data on the Flash Memory Card has not been tampered with, and there are no hardware problems on this unit, then the system will respond with Unlocked successfully.
5. Press **DONE**, then turn the key switch back to the ON position to resume use of the unit.

Change the Flash Card

If the flash card is bad, take the following steps to change the flash card.

1. Turn the power off to the unit by switching the key switch to the OFF position.
2. Touch the key switch with one hand to discharge any static build-up.
3. Remove the old Flash Memory Card if there is one in the system. You may need to unlock the access door to reach the Flash Memory Card. A special circular key is used to unlock this access door.

4. Insert the new Flash Memory Card into the card reader. There is only one correct orientation of the Flash Memory Card and the system will not allow you to insert it the wrong way. Do not force the card in if there is resistance as you may damage the Flash Memory Card reader.
5. Close and lock the access door using the circular key.
6. Turn the key switch to the ON position.

Flash Card is Removed When the AutoMARK is On

If the Flash Card is removed when the AutoMARK is on, follow the procedure described under the Change the Flash Card heading.

Reset the Unit

If you receive any of the following errors, reset the AutoMARK.

- You hear a "hissing" noise coming from the inside of the AutoMARK mechanism.
- The key switch fails to bring the unit into test mode.
- The system appears to lock up with no buttons available to press.
- The system repeatedly fails to recognize a correct ballot.
- The Flash Memory Card has been removed.
- There was an error reading the Flash Memory Card at power-up.

Take the following steps to reset the unit.

1. Turn the key switch to the off position.
2. Wait at least 3 seconds for the charge to die down.
3. Turn the key switch to the on position.

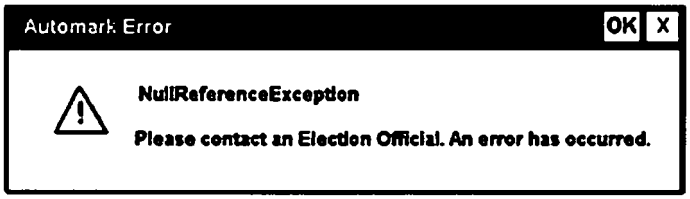
Error Messages

Refer to the Print the Operation Log (System Log File) heading in Chapter 11: Maintenance for information about the Operation Log.

Error messages are displayed on the touch screen monitor when AutoMARK detects a critical condition that requires operator intervention to correct the problem before the selection process can be continued.

The international symbol ⚠ may accompany various error messages. These messages may or may not be translated into the voter's native language. For this reason, the Jurisdiction may wish to place a multi-lingual sign in the polling booth that explains that the symbol means an error has occurred and they should alert one of the election officials.

For example:



Any of the Error conditions listed below may result in an unstable system. If an unrecoverable error message exists on the screen or the system is exhibiting unstable behavior use the following method to restart the system.

1. Make sure that you have election judges/ pollworkers from both parties present.
2. Turn the keyswitch to the off position.
3. Press the OK button on the message box (if there is one).
4. If the system does not power off within 5 to 10 seconds, try pressing the okay button again if it is still on the screen.

Note: The system may take up to 30 seconds to turn off.

5. After the system has powered off, turn the keyswitch ON again.

6. The system will reboot. If there is a ballot in the VAT, it will be ejected, and any voting sessions that were in progress will have to be restarted. Note that if the ballot was being marked when the error occurred, a security cover should be placed over the ballot as it comes out, the ballot should be spoiled, and the voter should be given a new blank ballot.

Note: Error messages are system alerts intended for Poll Workers. They will not follow federal guidelines for text size or AT accessibility.

The following table contains a list of error messages that may be displayed, the probable causes and resolutions.

Error Messages

Error Message/Description	Probable Cause	Solution
ERROR – PAPER MISFEED	Ballot was inserted incorrectly and the AutoMARK paper feed mechanism was not able to align the ballot for scanning operations.	1. Open the top panel or the rear clean out panel. 2. Remove the ballot. 3. If the ballot is not damaged, re-insert the ballot correctly.
ERROR – PAPER JAM	Paper ballot was inserted correctly, but the AutoMARK tractor feed mechanism cannot move ballot into the next position.	1. Open the top panel or the rear clean out panel. 2. Remove the ballot. 3. If the ballot is not damaged, re-insert the ballot correctly.
ERROR – Ballot Has Not Been Recognized	System is unable to read election information programmed and/or stored on the compact flash memory card (FMC).	1. Shutdown AutoMARK. 2. Remove compact FMC. 3. Reprogram FMC with correct data. 4. Touch the key switch with one hand to discharge any static build-up 5. Insert FMC in AutoMARK. 6. Start the AutoMARK. Note: If the FMC allows for manually ID ballot, the voter will be allowed to select a ballot format if the AutoMARK does not recognize the ballot upon insertion.

Error Messages *(continued)*

Area	Error Message/ Description	Probable Cause	Solution
Startup	Scanners have not been Calibrated.	The system has detected that there is something wrong with the factory calibration of the ballot scanners or something is obstructing the scanners.	Make sure there is no ballot or paper located in the VAT. If the problem persists, a scanner calibration has to be performed by qualified service personnel. Refer to the *Systems and Maintenance Manual*.
Startup (Win XP)	The ballot could not be loaded.	The system was not able to load the ballot that the user attempted to preview.	Restart the computer.
Scanning	File read error. <Error number>	Displayed when a file error occurred during the scanning process.	Turn the system off, wait for 15 solid seconds with the system off, and then turn the system on again. If the problem keeps repeating, then try a different Flash Memory Card or have the unit serviced.
Scanning	Unknown scanner event <event code>	This message and the displayed event code should be reported to the AutoMARK customer service team.	This message and the displayed event code should be reported to the AutoMARK customer service team.
Flash Card	The Flash Card has been removed. Turn OFF the unit and insert a valid Flash Card.	System detected that the flash card was removed or tampered with.	Turn the key switch to the off position. (Touch the key switch with one hand to discharge any static build-up.) Replace the Flash Memory Card, if necessary, and then turn the key switch to the ON position.

Troubleshooting Checklist

The following table consists of additional troubleshooting suggestions.

Troubleshooting Checklist

Problem	Probable Causes	Solution
Ballot selections not marked	Ink supply is low	Replace printer cartridge
Ballot selections marked incorrectly	Election information may be setup wrong on the compact flash memory card (FMC)	Re-program information on FMC and test
Marked ballot cannot be read	Ballot style is unacceptable or optical cameras in scanner device are not functioning correctly	If ballot style is unacceptable, have the voter mark an acceptable ballot style. Insert Proper ballot style.
AutoMARK will not start up without plugging it into an AC outlet	Battery is low	Recharge battery. Charge battery for 6 hours.
No response when screen images are touched	Unknown	Shutdown and restart system. If problem still exists, call your service representative for service
Audio presentation does not correspond with text displayed	Election information may be setup wrong on the compact flash memory card (FMC)	Re-program information on FMC and test
No response when a key on the keypad is pressed	Unknown	Shutdown and restart system. If problem still exists, call your service representative for service.
No response when remote keypad or Puff-Sip device is use.	Device cable connection is not properly attached to the dual-switch access (DSA) port	Check all connections, then shutdown and restart the system if necessary
Unable to hear audio presentation	Headphone connection is not properly inserted into the audio jack	Check all connections, then shutdown and restart the system if necessary

Spoiled Ballot Procedure

If you encounter an error that causes a spoiled ballot, eject the ballot to the voter and **do not** look at the voter's selections. Follow your local procedures for a spoiled ballot.

Chapter 13: Security Measures

Access Control

General Access Control Policy

It is the responsibility of the jurisdiction to provide a secure physical and procedural environment for the storage, handling, preparation, and transportation of the system hardware.

The VAT should be kept in a secure location in a manner similar to other voting units, ballots and other election equipment or records.

Recommended policy for access controls are as follows. The Compact Flash content shall be programmed and verified by jurisdiction election staff. Pre-programmed Flash Memory Cards can be inserted and sealed into individual poll site units prior to Election Day, or delivered to the poll site by the Election Official for installation on Election Day.

Individual Access Privileges

The Election Official or a person authorized by the jurisdiction should do the following:

- Retain possession of the key to power on the VAT.

Note: The key must be in the VAT, and turned to TEST in order to access the Administrative screens on the VAT.

- Retain possession of the key to unlock and lock the Compact Flash compartment.
- Set the security code for the VAT System Maintenance Menu and keep private.

Access Control Measures

Unauthorized access to the Flash Memory Card is prevented by means of a locked compartment. Election officials at the poll site level will use the Compact Flash compartment key to unlock the compartment, insert the Flash Memory Card, and lock the compartment prior to opening the polls for voting. No further access to the Compact Flash is necessary until the polls are closed, when it can be removed.

Polling Place Security

The AutoMARK is powered on and off by use of a key. Removal of this key will prevent unauthorized use when VAT is left unattended.

Physical security measures for the AutoMARK system include a locked compartment to prevent access to the Flash Memory Card. The Flash Memory Card contains ballot format information. The compartment is locked with a key. The key is held by the poll site staff.

A security code is required to access the System Maintenance Menu items on the VAT, such as setting the time and date, or uploading new firmware. The security code should be reset by the designated official and kept private.

Headphones can be used to provide audio of the various ballot choices and the display screen can be turned off to prevent unauthorized access to vote information from a voter with visual impairments.

Error Messages *(continued)*

Error Message/Description	Probable Cause	Solution
General Error -Examples include *Argument Out of Range Exception* and *Null Reference Exception*.	Probable cause is an error in the software or a low memory condition.	1. Make sure that you have election judges/ pollworkers from both parties present. 2. Turn the key switch to the Off position. 3. Press the OK button on the message box (if there is one). 4. If the system does not power off within 5 to 10 seconds, try pressing the okay button again if it is still on the screen. (Note: the system may take up to 30 seconds to turn off.) 5. After the system has powered off, turn the keyswitch ON again. 6. The system will reboot. If there is a ballot in the VAT, it will be ejected, and any voting sessions that were in progress will have to be restarted. If the ballot was being marked when the error occurred, a security cover should be placed over the ballot as it comes out, the ballot should be spoiled, and the voter should be given a new blank ballot.
Alert! A problem has occurred. Please notify an election official. There was an error while printing.	• Printer cartridge is empty or not depositing ink properly. • The printer of the VAT is not calibrated. • There is a paper jam	1. Make sure printer cartridge is functioning properly and is not out of ink. Replace printer cartridge if needed. 2. Ensure that the unit is calibrated correctly for printing. Refer to the Calibrate the Printer heading in Chapter 11: Maintenance. 3. If the ballot has not already been ejected, turn the key to TEST mode to eject the ballot. Spoil the ballot and provide a new ballot to the voter. 4. If there a paper jam, follow the instructions under the Clear a Paper Jam heading in this chapter.

Error Messages

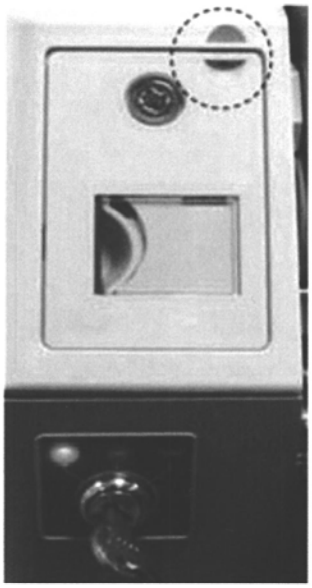
Area	Error Message/ Description	Probable Cause	Solution
Startup	Waiting for Flash Card to become available... (this may take 30 seconds or more)"	There is either no flashcard inserted or the inserted flashcard is not complying with the export format. Another cause for this in DV2.0 units is that the system was not powered up properly and the Flash Memory Card reader was not enumerated properly.	Turn the system off, wait for 15 solid seconds with the system off, and then turn the system on again. If the problem keeps repeating, then try a different Flash Memory Card or have the unit serviced.
Startup	There are no ballots on the Flash Card and file read error is seen. Turn OFF the unit and check if a valid Flash Card is present.	The AutoMARK library was not able to import the ballots. There are no ballots available for the GUI to process.	Try a different Flash Memory Card.
Startup	AutoMARK Datafile Read Error. Message: <system err. Msg> Filename: <impacted file> Please power-off the system and replace the flash card. Touch the OK button after you have turned the keyswitch to the OFF position.	There is either a missing data file or a data file is not formatted right.	Turn the system off, wait for 15 solid seconds with the system off, and then turn the system on again. If the problem keeps repeating, try a different Flash Memory Card or have the unit serviced.
Startup	Alert! A problem has occurred. Please notify an election official. Files have been tampered with or wrong access code!	The system detected that the flashcard data has been tampered and is not the original data that was exported. An additional cause could be that the pin code that was entered in the unlock screen was not the correct pin code for this particular set of data.	Make sure the pin code is correct. See earlier instructions for unlocking the Flash Memory Card. If possible, get a new Flash Memory Card or data set.

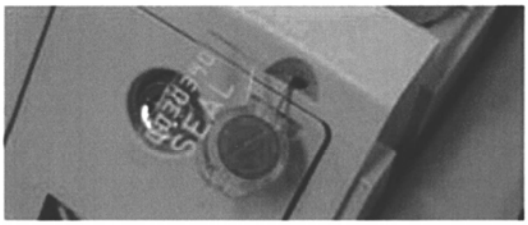
Security Seal Locations

There are several locations on the AutoMARK that are suitable for applying security seals during the election.

Note: In addition, you can place tamper-evident tape along the seams of the VAT so that when poll workers monitor the VAT, it is visually easy to ensure that no one has tried to open the VAT during the election.

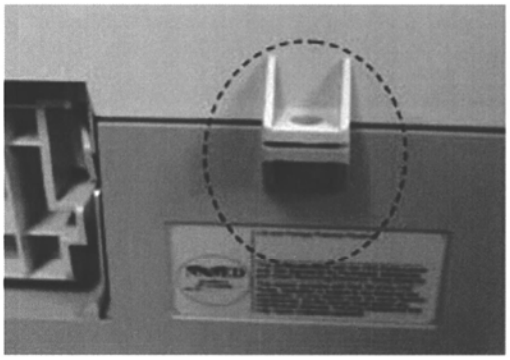
- The first location is in the front compartment of the unit that allows access to the CF card. This compartment has a key lock, but can also be sealed with a security seal.





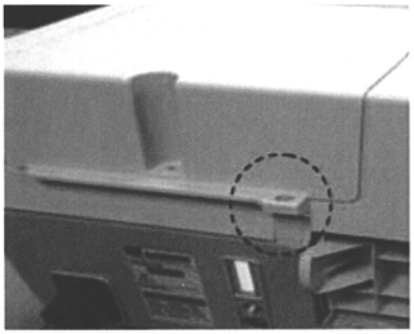
To secure the AutoMARK, insert the Flash Memory Card containing the election definition. Close and lock the access door using the round key. Place a wire seal through the case and door as shown.

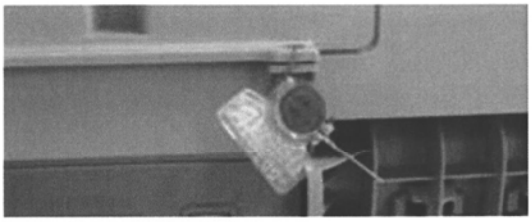
- The second location is in the rear of the unit opposite the power plug. This seal prevents the top cover from being uninstalled without removing the seal.



Secure the rear of the housing by inserting a seal through the loop molded into the back of the case.

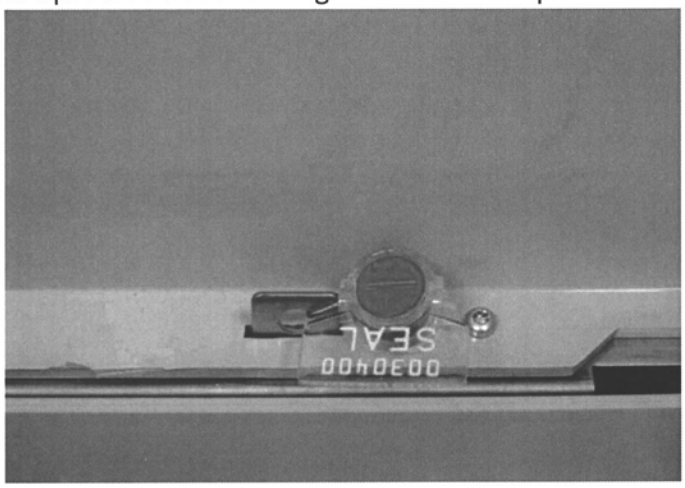
- The third location is on the top, rear of the unit on the printer compartment door. Sealing this compartment prevents access to the printer cartridge.



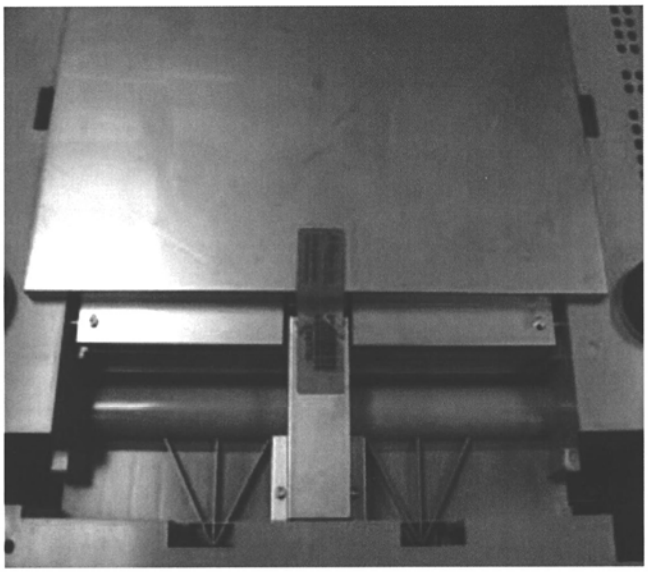


Close the printer access door and secure it with a wire seal.

- You can further secure the AutoMARK by tipping the LCD display forward and the display cover up. Place a seal through the metal clasp beside the inside cleanout tray.



- A security seal can also be added to the bottom of the AutoMARK to show if the bottom has been removed.



- If your AutoMARK is equipped with an optional hash check USB port, secure it by inserting a wire seal through the metal clasp.

Part 2: Appendix

- Chapter 14: System Acquisition Procedures
- Chapter 15: Revision History

Chapter 14: System Acquisition Procedures

Use the following checklist to verify your Acceptance Criteria:

Inspector_____

Serial Number_____

Date:_____

Acceptance Q.C. Testing:

Setup

- ☐ Place AutoMARK on Firm Surface
- ☐ Connect AC cord to unit and wall outlet
- ☐ Connect Headphones
- ☐ Insert Key

Visual Inspection

- ☐ Verify sample ballot compact flashcard installed
- ☐ Verify battery installed
- ☐ Verify top and rear clean-out trays installed
- ☐ Verify print cartridge installed

Print Testing

- ☐ Turn key switch to test
- ☐ Wait for unit boot
- ☐ Wait for Power On Self-Test (P.O.S.T) to be completed with no errors displayed
- ☐ Press **Test Ballot Print** on the Test Mode screen
- ☐ Insert sample ballot and wait to print
- ☐ Repeat procedure in all orientations

- ☐ Press **Done**
- ☐ Calibrate as required

Keypad/Audio Testing

- ☐ Turn key switch to **ON**
- ☐ Verify "Insert Ballot" audio prompt
- ☐ Cycle Display Screen (diamond button)
- ☐ Verify **Repeat** key functionality
- ☐ Verify **Tempo** rocker key functionality
- ☐ Verify **Volume** rocker key functionality

Voting Process

- ☐ Insert sample ballot
- ☐ Complete voting process using touchscreen
- ☐ Print Ballot

- ☐ Insert sample ballot
- ☐ Complete voting process using key pad
- ☐ Print Ballot

- ☐ Insert previously printed ballot
- ☐ Verify that AutoMARK correctly identifies votes

Chapter 15: Revision History

AutoMARK System Operator Guide v.1.8
Document Version 5.0
February 20, 2013

Chapter	Description	Project
Entire Book	Style and typographical changes.	Jupiter

AutoMARK System Operator Guide v.1.8
Document Version 2.0
August 12, 2010

Chapter	Description	Project
Chapter 13: Security Measures	Documented new hash validation processes.	Deimos

AutoMARK System Operator Guide v.1.8
Document Version 1.0
July 15, 2010

Chapter	Description	Project
Entire Book	New Document based upon Unity 5.0	Mars

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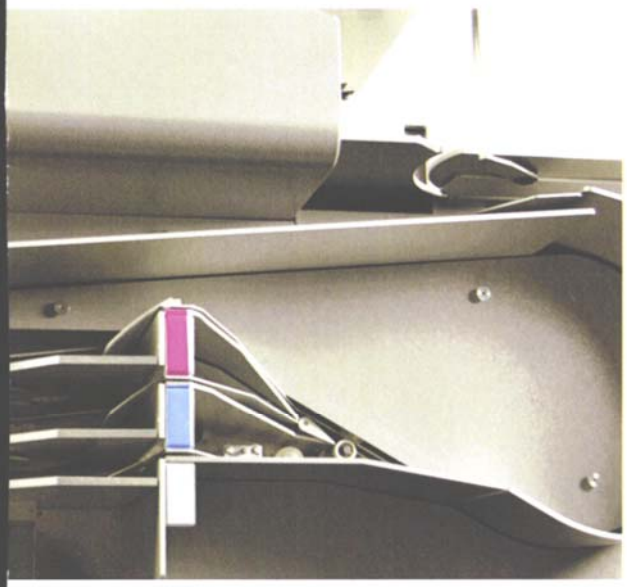
High-Speed Central Scanner

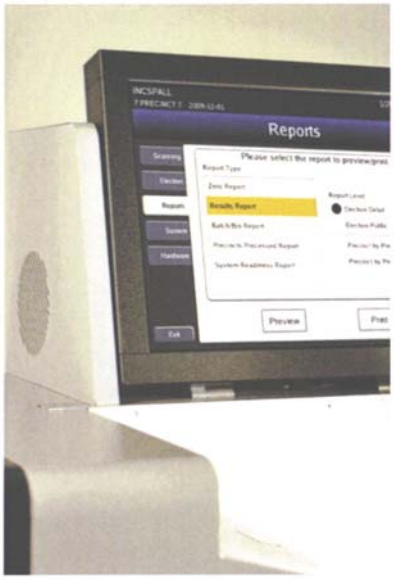
DS850®

The Next Generation of Paper-Based Vote Tabulation

You need a central scanner and tabulator that is quick and accurate. The DS850 gives you that and more. With its high-speed digital imaging solution, it continuously scans ballots to save you valuable time.

As the election industry leader, ES&S is committed to providing solutions to Election Administrators. Nothing is more important to us than supporting your successful election. We build vote tabulators that make that possible.





The Next Generation of Paper-Based Tabulation

High-Speed Sorting

DS850® is the industry's only high-speed scanner able to sort various ballot sizes at full speed. It scans and sorts 300 14-inch double-sided ballots per minute into three input and output trays to efficiently distribute ballots into counted, requiring further review, and write-ins categories.

Folded Ballot Processing

The DS850® was designed with a series of multiple TruGrip™ composite paper rollers that apply constant control to folded ballots throughout the entire process.

Intelligent Mark Recognition

Distinct image capturing and processing technologies are integrated with ES&S' patented Intelligent Mark Recognition to deliver fast and accurate election results.

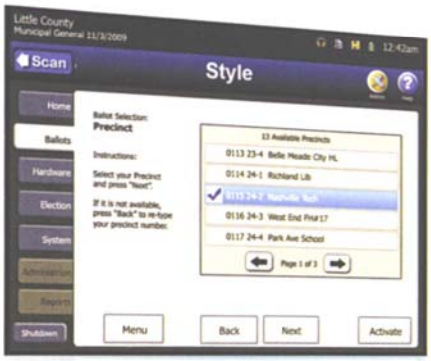
Integrated Solution

The DS850® is not the standard "off-the-shelf" scanner attached to a computer. It is, instead, an unmatched and fully integrated system designed specifically to address election industry challenges. Data transmission is simple and convenient using ES&S' next-generation products and provides the perfect solution for a central-count environment.

2005 VVSG Certified

Fully certified with the rigorous 2005 Voluntary Voting Systems Guidelines for usability, accessibility, and security requirements.

DS850®



Security and Accuracy

The DS850® features safeguards such as data encryption to protect sensitive data and digital signatures to verify data authenticity. It also validates all resident firmware against certified versions. System integrity and the ability to audit electronically and in real time makes this product the most dependable central scanner available.

Touch Screen Display

Featuring a 15-inch LCD color touch screen with an adjustable display fully incorporated into the unit, it allows the user to conserve valuable workspace and increase durability.

User-Friendly Design and Operation

Designed specifically for the election process, the DS850® features a user-friendly software interface. The S-shaped transporter enables superior and natural flow to separate the ballots.

ES&S remains at the forefront of the Election Industry by continuing to provide cutting-edge digital scanners and tabulators. In 2009, we launched the DS850® Central Tabulator to complement the DS200® Precinct Scanner.

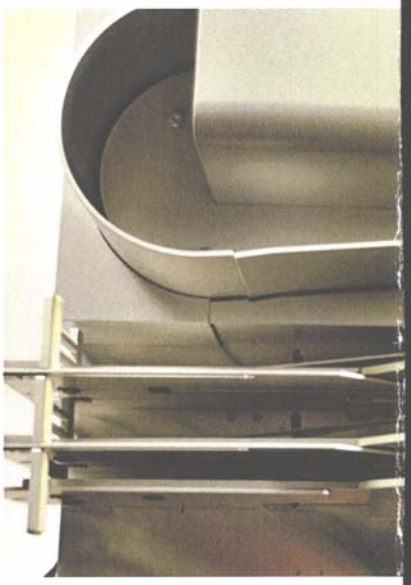
The DS850® is unrivaled in speed and accuracy. Its high-speed digital imaging solution allows for smooth, continuous ballot scanning from start to finish—saving valuable time during the election process!

The ES&S Business Model

Election Systems & Software entered the elections industry as a vote tabulation company. Over the years, we have consistently expanded our capabilities to provide high-quality, innovative solutions to meet every election-related need—ultimately improving the democratic process. From voter registration to vote tabulation, we pride ourselves on our ability to understand and manage each aspects of the election process.

Today, we not only work with the same customers we've served for more than 40 years, but our business has grown to serve four countries, and 41 states with more than 4,000 election offices.

Prepare	Vote	Tabulate	Report	Verify
PRE-ELECTION	ELECTION DAY			POST-ELECTION
Voter Registration **Ballot Layout** **Ballot Printing** **Tabulator Programming** **Training**	**Electronic Pollbooks** **Vote-by-Mail** **Early Voting** **ADA Ballots**	**Central Tabulation** **Precinct Paper Tabulation** **Touch Screen** **On-Site Support Services** **Customer Help Desk**	**Data Collection** **Results Reporting** **Techical Support**	**Canvassing** **Auditing** **Recounts**



www.essvote.com

ElectionWare®

Elections made easy

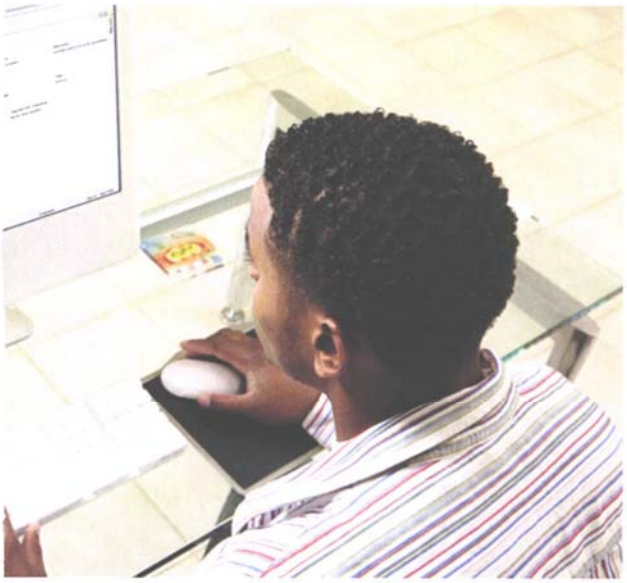
You have many things to think about leading up to and on Election Day. That's why we developed ElectionWare, a powerful Election Management Software (EMS).

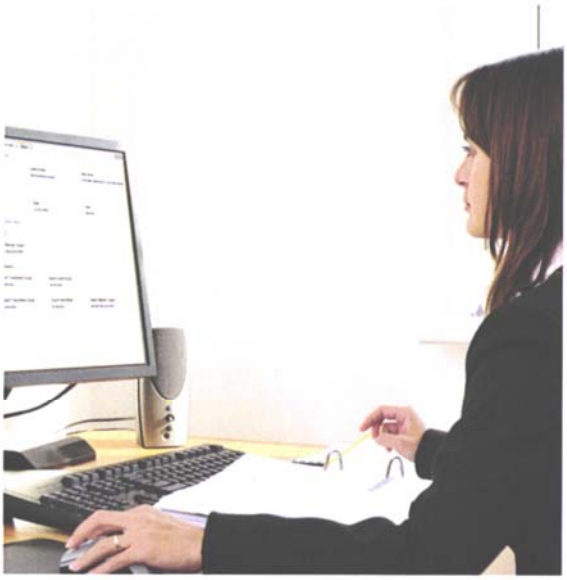
ElectionWare delivers everything needed to run an election, from creation to reporting. Its functionality and design make the user interface logical. This tool is designed for election officials who run accurate, efficient and secure elections.

Compliant with the latest voting systems standards

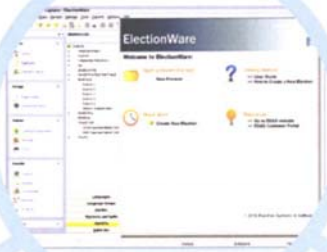
ElectionWare received certification from the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting Systems Guidelines.

CERTIFIED EAC CERTIFIED





electionware®
election management system



DS200

DS850

AutoMARK

Complete control of your Election

DEFINE GROUP

- Home - Creates your election
- Capture - Enters data and creates the ballot style
- Element Library - Develops Voter Prompt, Graphics, and Audio

DESIGN GROUP

- Paper Ballot - Layout your paper ballot
- Accessible Ballot - Layout your accessible ballot

MANAGE GROUP

- Setup - Setup users and audit reporting

DELIVER GROUP

- Configure - Processes files and configures them for tabulators and accessible devices
- Package - Burns your election media burning
- Print - Prints ballots on demand

RESULTS GROUP

- Acquire - Load ballot images and Cast Vote Records (CRV)
- Produce - Filter, view, print and export ballot images and CRVs

ElectionWare®

EASE OF USE

Intuitive, easy-to-use EMS software application

ONE INTERFACE

Streamlines access to and the management of information

ONLINE HELP SYSTEM

ElectionWare contains an interactive and comprehensive online help system

MULTI-USER

Teams of authorized election personnel may simultaneously enter information for the DS850, DS200, and ERM for different elections

SECURITY

Audit controls and change management processes are in built in to make sure your election data is safe and secure

Time Saver

ElectionWare uses automation instead of repetition. Reuse of previous election data instead of duplicative data entry, and built-in election and ballot templates instead of recreating ballot templates each new election, enables election administrators to create error-free elections inless time. It also has integrated warning and alerts and configurable levels of security based on the customer requirements.

The ES&S Business Model

Election Systems & Software entered the elections industry as a vote tabulation company. Over the years, we have consistently expanded our capabilities to provide high-quality, innovative solutions to meet every election-related need—ultimately improving the democratic process. From voter registration to vote tabulation, we pride ourselves on our ability to understand and manage each aspect of the election process.

Today, we not only work with the same customers we've served for more than 40 years, but our business has grown to serve four countries, and 41 states with more than 4,000 election offices.

Prepare	Vote	Tabulate	Report	Verify
PRE-ELECTION	ELECTION DAY			POST-ELECTION
Voter Registration **Ballot Layout** **Ballot Printing** **Tabulator Programming** **Training**	**Electronic Pollbooks** **Vote-by-Mail** **Early Voting** **ADA Ballots**	**Central Tabulation** **Precinct Paper Tabulation** **Touch Screen** **On-Site Support Services** **Customer Help Desk**	**Data Collection** **Results Reporting** **Techical Support**	**Canvassing** **Auditing** **Recounts**

www.essvote.com

AutoMARK®
Voter Assist Terminal

Election officials and organizations representing people with disabilities wanted to give voters with special needs the ability to mark their ballots independently and privately.

ES&S listened and developed the AutoMARK®, a ballot-marking system designed to provide autonomy to voters who are blind, visually impaired, or have a disability or condition that makes it difficult to traditionally mark a ballot. With its revolutionary technology, AutoMARK® Voter Assist Terminal is the future of paper ballot marking.

Simply adding an ES&S AutoMARK® device to your polling location ensures compliance with federal Help America Vote Act (HAVA) accessibility requirements and eliminates the need to reinvest in a new tabulation system.

experience
reliability
security
innovation

Key Features and Benefits

AutoCAST™

Allows voters to cast ballots without assistance directly into a secure ballot box after verification

Hash Check

Provides jurisdictions the opportunity to securely validate securely the firmware version

Audio Function

- Voter hears list of candidates through headphones
- Synthesized voice enables voter control of speech speed and volume
- Choices may be repeated easily
- Selections are read back to voter at the end of session, ensuring proper selections was made

Summary Verification Process

Ensures that no races are accidentally under-voted, over-voted, or left blank, providing voters the opportunity to adjust selections before casting their ballots

Zoom Feature

- Voters are able to increase font size displayed on the viewing touch screen
- Adjustable brightness contrast helps voters with limited vision or macular degeneration
- Compatible with current voting systems

Sip-and-puff Tube

- Voters unable to use the touch screen or touch pad are able to vote autonomously

1

Voter picks up a paper ballot at registration desk and is directed to the AutoMARK voting station

2

Selections are made by a voter autonomously using the AutoMARK accessories

3

After the ballot is marked and verified, voter may deposit the ballot into a DS200 or give the ballot to a poll worker for tabulation through the DS850

maintaining voter confidence. enhancing the voting experience.

11208 John Galt Boulevard | Omaha, NE 68137 USA | P: 402.593.0101 | TF: 1.800.247.8683 | F: 402.593.8107

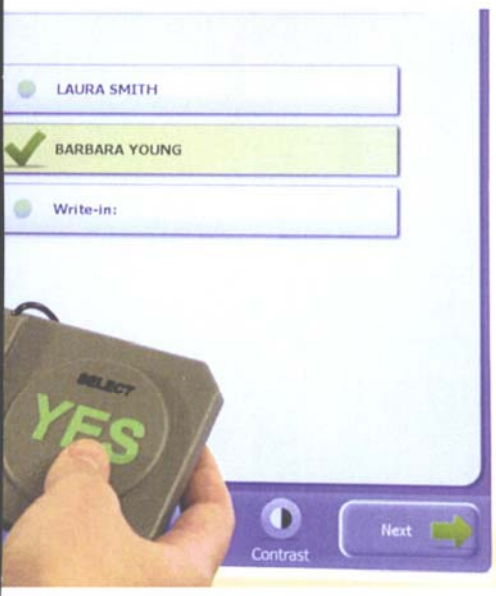
www.essvote.com | hardware@essvote.com | software@essvote.com

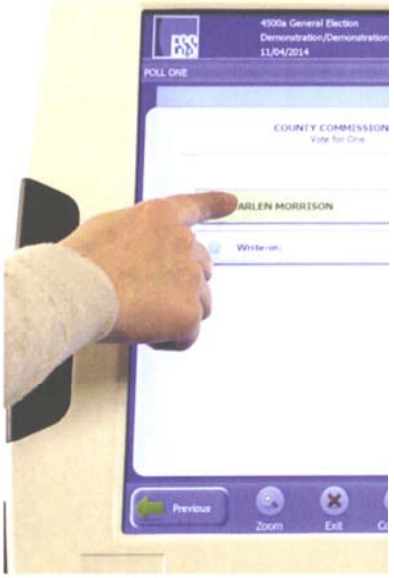
Universal Voting System

ExpressVote®

ExpressVote® combines paper-based voting with touch screen to create a breakthrough in voting solutions. Used in Early Vote Center and on Election Day in precincts or in Vote Centers, the ExpressVote® handles it all. No longer must election officials guess the number of ballots to print—instead a Vote Session Activator™ is printed with a barcode which determines the ballot style presented on the touch screen.

Accommodating to various election needs, this system can serve all voters, even those with special needs, allowing voters to vote autonomously with tabulation done in the exact same manner. ES&S has a strong development history of innovative solutions for people with disabilities. A feature rich system, ExpressVote® is for people with or without visual impairments, hearing issues, and physical accommodations.





Universal Voting System

Innovative Design

- Detachable tactile navigational key pad with Braille and raised shaped keys can be used remotely
- Complete and total independence is maintained while voter casts their own ballot
- Selection changes will not spoil their voting session
- Sip and puff capability
- Official ballot provided in both audio and visual formats
- Disabled and non-disabled voting can take place simultaneously

Voter Confidence

- Produces verifiable vote record
- Supports multiple languages
- Convenient direct-recording electronic machine with the peace of mind of a paper ballot trail

Easy to Set-up and Use

- One-step open and close procedures
- Single coding event
- Intuitive design offers streamlined simplicity for voters, election judges and election staff
- One set of vote totals as all tabulation occurs on a single machine

2005 VVSG Compliant

- ExpressVote® meets and exceeds the more rigorous 2005 Voluntary Voting Systems Guidelines for usability, accessibility and security requirements

Control Your Spending

- Significant reduction in ballot printing costs
- Eliminate need for pre-printed paper ballots
- Low operation and maintenance fees
- Single unit deployment makes delivery easy

Voting with the ExpressVote

Voters check-in through pollbook. Voter is handed a Vote Session Activator.™

Insert the ExpressVote Activation Card given to you by the poll worker.

COMPLIANT VVSG 2005 COMPLIANT

ExpressVote®

ExpressVote® combines touch screen technology with paper-based voting to create a breakthrough in voting solutions. Used in early voting and on Election Day, the ExpressVote® handles it all. No longer must election officials guess the number of ballots to print—instead a Vote Session Activator™ is printed with a barcode which determines the ballot style to present on the touch screen. Accommodating to various election needs, this system can serve all voters, even those with special needs, allowing voters to vote autonomously with tabulation done in the exact same manner.

When prompted, scan your barcode by holding it in front of the scanner.

Review all selections on the summary screen. If you need to change a selection, simply press the contest and be redirected to the selection screen for that contest. When you have completed reviewing your selections, press print and remove the voted card. Voters deposit their Vote Record into the DS200®.

The ES&S Business Model

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www.essvote.com

Appendix J
ES&S Exceptions to T&C;s

Uniform Instructions

Section 3 – Offer Preparation

3.4 Exceptions to Terms and Conditions. All exceptions included with the Offer shall be submitted in a clearly identified separate section of the Offer in which the Responder clearly identifies the specific paragraphs of the Solicitation where the exceptions occur. Any exceptions not included in such a section shall be without force and effect in any resulting Contract unless such exception is specifically accepted by the Procurement Officer in a written statement. The Responder's preprinted or standard terms will not be considered by the County as a part of any resulting Contract.

ES&S Response:

ES&S has included limited suggestions for alternative language in response to certain terms and conditions or otherwise requested the opportunity to further discuss certain items in the event it is the successful Responder. ES&S has included its proposed exceptions and alternative language in Appendix J of its proposal. ES&S fully understands that the County is under no obligation to accept any wording changes which we may have submitted in our proposal and we have made every effort to fully comply with all requirements of the RFP and be responsive. In addition, ES&S acknowledges that its standard terms will not be considered by the County as a party of any resulting Contract, however, ES&S requests that the County consider incorporating certain of ES&S terms and conditions associated with the license of its software and firmware. ES&S has included such proposed terms at the end of Appendix J for the County's review and consideration.

Exceptions/Requests for Clarification

Item	Issue	Proposed Language
Special Terms and Conditions Section 7 – Insurance Requirements Subsection B – Bond Requirement	ES&S acknowledges this provision and agrees to provide the requisite performance bond in the event ES&S is the successful Responder. However, surety companies normally will not issue a performance bond until a formal Contract is in place. Therefore, ES&S requests that County allow ES&S to submit the performance bond once the Contract has been executed.	C. BOND REQUIREMENT: 1.1.1 Concurrently with the award of the Contract, the Contractor shall furnish a letter from the Contractor's surety to the Contracting Agency within 24 hours which provides that the Contractor's surety will provide the bonds set forth herein upon the execution of a contract by the parties. Within two (2) business days from contract execution, the following bonds shall be provided by the Contractor. 1.1.1.1 A Performance Bond equal to the full Contract amount conditioned upon the faithful performance of the Contract in accordance with plans, specifications and conditions thereof. Such bond shall be solely for the protection of the Contracting Agency awarding the Contract.

Item	Issue	Proposed Language
		1.1.2 Each such bond shall include a provision allowing the prevailing party in a suit on such bond to recover as a part of his judgment such reasonable attorney's fees as may be fixed by a judge of the court. 1.1.3 Each bond shall be executed by a surety company or companies holding a certificate of authority to transact surety business in the State of Arizona issued by the Director of the Department of Insurance. The bonds shall not be executed by an individual surety or sureties. The bonds shall be made payable and acceptable to the Contracting Agency. The bonds shall be written or countersigned by an authorized representative of the surety who is either a resident of the State of Arizona or whose principal office is maintained in this state, as by law required, and the bonds shall have attached thereto a certified copy of the Power of Attorney of the signing official. In addition, said company or companies shall be rated "Best-A" or better as required by the Contracting Agency, as currently listed in the most recent Best Key Rating Guide, published by the A.M. Best Company.
Uniform Terms and Conditions Section 3 – Contract Administration and Operation Subsection 3.11 – Property of the County	ES&S acknowledges this provision and agrees that any property specifically created by ES&S for the County under a resulting Contract and which does not contain any pre-existing ES&S intellectual property shall be the property of the County. All other property, including pre-existing intellectual property which may be associated with a deliverable and/or product not specifically created by ES&S for the State shall remain, at all times, the	3.11 Property of the County. Any materials, including reports, computer programs and other deliverables, specifically created under this Contract and which do not contain any Contractor intellectual property are the sole property of the County. The Contractor is not entitled to a patent or copyright on those materials and may not transfer the patent or copyright to anyone else. The Contractor shall not use or release these materials without the prior

Item	Issue	Proposed Language
	property of ES&S	written consent of the County.
Uniform Terms and Conditions Section 3 – Contract Administration and Operation Subsection 3.13 – Ownership of Intellectual Property	ES&S acknowledges this provision and agrees that any intellectual property associated with a deliverable and/or product specifically created by ES&S for the County under a resulting Contract and which does not contain any pre-existing ES&S intellectual property shall be a work made for hire. All other intellectual property, including pre-existing intellectual property which may be associated with a deliverable and/or product not specifically created by ES&S for the State shall remain, at all times, the intellectual property of ES&S.	3.13 Ownership of Intellectual Property. Any and all intellectual property, including but not limited to copyright, invention, trademark, tradename, service mark, and/or trade secrets specifically created by the Contractor for the County pursuant to or as a result of this contract and any related subcontract which does not contain any pre-existing Contractor or subcontractor intellectual property ("Intellectual Property"), shall be work made for hire and the County shall be considered the creator of such Intellectual Property. The Pinal County department requesting the issuance of this contract shall own (for and on behalf of the County) the entire right, title and interest to the Intellectual Property throughout the world. Contractor shall notify the County, within thirty (30) days, of the creation of any Intellectual Property by it or its subcontractor(s). Contractor, on behalf of itself and any subcontractor (s), agrees to execute any and all document(s) necessary to assure ownership of the Intellectual Property vests in the County and shall take no affirmative actions that might have the effect of vesting all or part of the Intellectual Property in any entity other than the County. The Intellectual Property shall not be disclosed by contractor or its subcontractor(s) to any entity not the County without the express written authorization of the Pinal County department requesting the issuance of this contract.
Uniform Terms and Conditions Section 6 – Risk and Liability Subsection 6.2 – Indemnification	ES&S acknowledges this provision and agrees to language set forth in the County's Indemnification provision. However, in order to	Neither party shall be liable for any indirect, incidental, punitive, exemplary, special or consequential damages of any kind whatsoever arising out of or

Item	Issue	Proposed Language
	appropriately identify ES&S' potential exposure related to the requested indemnification provision, a limitation of liability provision should be included in any resulting contract substantially in the form of the limitation of liability provision proposed herein. Claims for intellectual property infringement, personal injury, including death and damage to property shall be excluded from the limitation of liability provision.	relating to this Contract. Neither party shall be liable for the other party's negligent or willful misconduct. Except for claims associated with intellectual property infringement, personal injury (including death) and personal property damage, Contractor's total liability to County arising out of or relating to this Contract shall not exceed the aggregate amount to be paid to Contractor hereunder. By entering into this Contract, County agrees to accept responsibility for (a) the selection of the equipment and software to achieve County's intended results; (b) the use of the equipment and software; (c) the results obtained from the use of the equipment and software; (d) the selection of, use of and results obtained from any equipment, software or services not provided by Contractor and used with the equipment or software; or (e) user errors, voter errors or problems encountered by any individual in voting that are not otherwise a result of the failure of Contractor to perform.
Uniform Terms and Conditions Section 7 – Warranties Subsection 7.2 – Quality	ES&S acknowledges this provision and will provide a one (1) year warranty on its proprietary equipment and software. Such warranty provides that ES&S will repair or replace any component of our proprietary equipment or software which, while under normal use and service, (a) fails to perform in accordance with its documentation in all material respects, or (b) is defective in material or workmanship. ES&S also warrants that its proprietary equipment and software will operate in conjunction with all third party equipment and software that meets ES&S' specifications. This warranty is provided subject to certain conditions which are set forth	7.2 Quality/Warranty. 7.2.1 Quality. Unless otherwise modified elsewhere in these terms and conditions, the Contractor warrants that, for one year after acceptance by the County of the materials, they shall be: Of a quality to pass without objection in the trade under the Contract description; Fit for the intended purposes for which the materials are used; Within the variations permitted by the Contract and are of even kind, quantity, and quality within each unit and among all units; Adequately contained, packaged and marked as the Contract may require; and Conform to the written promises or affirmations of fact made by the Contractor

Item	Issue	Proposed Language
	herein.	7.2.2 Contractor Equipment and Contractor Software Warranty. Contractor warrants that for a 1-year period (the "Warranty Period"), it will repair or replace any component of the Contractor equipment or Contractor software which, while under normal use and service: (i) fails to perform in accordance with its documentation in all material respects, or (ii) is defective in material or workmanship. The Warranty shall not include the repair or replacement of any Contractor equipment components that are consumed in the normal course of operating the equipment, including printer ribbons, printer cartridges, paper rolls, batteries, removable media storage devices, PCMCIA cards or marking devices. The Warranty Period will commence upon completion of the Acceptance Testing. Any repaired or replaced item of Contractor equipment or Contractor software shall be warranted only for the unexpired term of the Warranty Period. All replaced components of the Contractor Equipment or Contractor Software will become the property of Contractor. This warranty is effective provided that (I) County promptly notifies Contractor of the failure of performance or defect and is otherwise in compliance with its obligations hereunder, (II) the Contractor Equipment or Contractor Software to be repaired or replaced has not been repaired, changed, modified or altered except as authorized or approved by Contractor, (III) the Contractor Equipment or Contractor Software to be repaired or replaced is not damaged as a result of accident, theft, vandalism, neglect, abuse, use which is not in accordance with

Item	Issue	Proposed Language
		instructions or specifications furnished by Contractor or causes beyond the reasonable control of Contractor or County, including, but not limited to, acts of God, fire, riots, acts of war, terrorism or insurrection, labor disputes, transportation delays, governmental regulations and utility or communication interruptions, and (IV) County has installed and is using the most recent Update, provided to it by Contractor. This warranty is void for any units of equipment which: (i) have not been stored or operated in a temperature range according their specifications, (ii) have been severely handled so as to cause mechanical damage to the unit, or (iii) have been operated or handled in a manner inconsistent with reasonable treatment of an electronic product. 7.2.3 System. Contractor warrants that the Contractor equipment and Contractor software will operate in conjunction with the third party items, if applicable, during the Warranty Period, provided that (i) County has installed and is using the most recent Update, provided to it by Contractor, and (ii) the third party items are performing in accordance with their own specifications and documentation in all material respects and are not defective in material or workmanship. In the event of a breach of this warranty, Contractor will repair or replace the item of Contractor equipment or Contractor software that is causing such breach to occur. County acknowledges that Contractor has merely purchased the third party items for resale or rental to County, and that the proprietary and intellectual property rights to

Item	Issue	Proposed Language
		the third party items are owned by parties other than Contractor ("Third Parties"). County further acknowledges that except for the payment to Contractor for the third party items, all of its rights and obligations with respect thereto flow from and to the Third Parties. 7.2.4 **Exclusive Remedies.** **IN THE EVENT OF A BREACH OF SUBSECTIONS 7.2.2 or 7.2.3, CONTRACTOR's OBLIGATIONS, AS DESCRIBED IN SUCH SUBSECTION, ARE COUNTY'S SOLE AND EXCLUSIVE REMEDIES. ES&S EXPRESSLY DISCLAIMS ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, WHICH ARE NOT SPECIFICALLY SET FORTH IN THIS CONTRACT.**
Uniform Terms and Conditions Section 9 – Contract Termination Subsection 9.5 – Termination for Default	ES&S acknowledges this provision. However, generally, parties to a contract are able to exercise the extraordinary remedy of termination only in the event of material default by the other party. Contractor proposes adjusting the language in this section to permit termination if there is a material breach. Contractor also has merely clarified that termination for material default will be subject to a 30 day right to cure.	9.5 Termination for Default. The County reserves the right to terminate any part or all of a contract resulting from this solicitation if the Contractor fails to carry out any term, promise, or condition of the contract. The County will issue a written Notice of Default to the Contractor and the Contractor shall have thirty (30) days to cure any such Default from the date of the Notice of Default, if in the opinion of the County, the Contractor: 9.5.1 Is or becomes insolvent or is a party to any voluntary bankruptcy or receivership proceeding, makes an assignment for a creditor, or there is any similar action that affects Contractor's capability to perform under the contract resulting from this solicitation. 9.5.2 Is the subject of a petition for involuntary bankruptcy not removed within sixty (60) days.

Item	Issue	Proposed Language
		9.5.3 Fails to obtain and/or keep any required bonds and insurance policies in full force and effect at all times during the term of the contract. 9.5.4 Provides services that do not meet the requirements of the contract or conducts business in an unethical or illegal manner. 9.5.5 Fails to complete the required work or fails to perform required services within the time frame stipulated. 9.5.6 Fails to materially perform or comply with the terms and conditions of the contract resulting from this solicitation. Failure of the Contractor to remedy any problems noted by the deadline (provided such deadline shall in no event be less than thirty (30) days) set in the Notice of Default or to otherwise bring performance to satisfactory levels that are within the requirements of the Contract shall give the County cause to cancel this contract. If the County terminates the contract, the Contractor will be provided with a written notice that specifies the effective date of the termination. After receipt of the Notice of Termination, the Contractor agrees to perform under the terms and conditions of this contract up to and including the date of termination as though no termination has been made. In addition, the Contractor shall deliver to the Procurement Office all data, drawings, specifications, reports, estimates, summaries and other information and materials accumulated in performing this contract, whether completed or not provided the County pays for all such information. If the Contract is terminated for default, the County reserves the

Item	Issue	Proposed Language
		right to purchase the goods and/or services required under the contract from the open market, to complete required work itself or have it completed at the expense of the Contractor. The County may recover any excess costs by (1) deduction from an unpaid balance due to the Contractor; (2) collection against the proposal and/or performance security; if any; (3) collection against liquidated damages (if applicable); or (4) a combination of the aforementioned remedies or other remedies as provided by law.

Additional ES&S Proposed Terms:

1. **Grant of License.** Subject to the terms and conditions of this Contract, Contractor hereby grants to County a nonexclusive, nontransferable license for its bona fide full time employees to use the Contractor Software and Documentation supplied by Contractor. The license allows County to use and copy the Contractor Software (in object code only) and the Documentation, solely for the purposes of defining an election and tabulating and reporting election results in the Jurisdiction. The licenses granted in this Section do not permit County to use the source code for the Contractor Software. The license does not permit County to take any of the following actions:

a. Reverse engineer, decompile, disassemble, re-engineer or otherwise create, attempt to create, or permit, allow or assist others to create, the source code or the structural framework for part or all of the Contractor Software;

b. Cause or permit any use, display, loan, publication, transfer of possession, sublicensing or other dissemination of the Software or Documentation, in whole or in part, to or by any third party including, but not limited to, any transfer of possession to, or use of the Contractor Software or Documentation by any third party to perform any services for County (including, but not limited to, any coding, programming or layout services) without Contractor' prior written consent; or

c. Cause or permit any change to be made to the Contractor Software without Contractor' prior written consent.

d. Allow a third party to cause or permit any copying, reproduction or printing of any output generated by the Software in which Contractor owns or claims any proprietary intellectual property rights (e.g., copyright, trademark, patent pending or patent), including, but not limited to, any ballot shells or ballot code stock.

2. **License Fees**. In consideration for Contractor's grant of the license for the Contractor Software described in Section 1, County shall pay Contractor the Contractor Software License Fees set forth in the Contract. The consideration for Contractor' grant of the license for the Contractor Firmware is included in

the cost of the Contractor Equipment. Any license or royalty fees payable to any Third Parties for the use of any Third Party Items are the sole responsibility of County.

3. **Term of Licenses**. The licenses granted in Section 1 shall commence upon the delivery of the Contractor Software described in Section 1 and shall continue for a one-year period (the "Initial License Term). Upon expiration of the Initial License Term, the licenses shall automatically renew for an unlimited number of successive one-year periods (each a "License Renewal Term") upon the payment by County of the annual software license and software maintenance and support fee as set forth herein. Contractor may terminate either license if County fails to pay the consideration due for, or breaches Sections 1, 2, or 7 with respect to, such license. Upon the termination of either of the licenses granted in Section 1 for Contractor Software or upon County's discontinuance of the use of any Contractor Software, County shall immediately return such Contractor Software and the related Documentation (including any and all copies thereof) to Contractor, or (if requested by Contractor) destroy such Contractor Software and Documentation and certify in writing to Contractor that such destruction has occurred.

4. **Updates.** During the Initial License Term or any License Renewal Term, Contractor may provide new releases, upgrades or maintenance patches to the Contractor Software, together with appropriate Documentation ("Updates"), on a schedule defined by Contractor. County is responsible for obtaining any upgrades or purchases of Third Party Items required to operate the Updates. All Updates shall be deemed to be Contractor Software for purposes of this Contract upon delivery. County may install the Updates in accordance with Contractor' recommended instructions or may request that Contractor install the Updates. Contractor may charge County at its then-current rates to (i) deliver the Updates to the County, (ii) train County on Updates, if such training is requested by County; (iii) install the Updates or (iv) provide maintenance and support on the Contractor Software that is required as a result of County's failure to timely or properly install an Update. County shall be responsible for any claim, damage, loss, judgment, penalty, cost, amount paid in settlement or fee which is caused by County's failure to install and use the most recent Update provided to it by Contractor. If County proposes changes in the Contractor Software to Contractor, such proposals will become Contractor' property. Contractor may, in its sole discretion, elect to make or not to make such changes without reference or compensation to County or any third party. Contractor represents to County that the Updates will comply with all applicable state law requirements at the time of delivery. County shall be responsible to ensure that it has installed and is using only certified versions of Contractor Software in accordance with applicable law. County shall pay Contractor for any Update which is required due to a change in state or local law. Upon termination of the Warranty Period, County shall be entitled to receive the Software License and Maintenance and Support described on Exhibit F if it has so elected in Section B of the signature page to this Contract.

5. **Compliance with Laws.** In performing its obligations or enjoying its rights under this Contract, each party shall comply with all applicable laws and regulations. In addition, Contractor warrants to County that, at the time of delivery, the Equipment and Software sold and licensed under this Contract will comply with all applicable requirements of state election laws and regulations that are mandatory and effective as of the Effective Date and will have been certified by the appropriate state authorities for use in the County's state. Contractor further warrants that during the Warranty Period and thereafter so long as County is subscribing and paying for Contractor Hardware Maintenance Services" and "Contractor Software License, Maintenance and Support Services, the Equipment and Software shall be maintained or upgraded by Contractor in such a way as to remain compliant with all applicable state election laws and regulations. "Maintained or upgraded" shall mean only such changes to individual items of the Software (but not Equipment) as are technologically feasible and commercially reasonable. County shall be solely responsible for the cost of any replacements, retrofits or modifications to the Equipment contracted for herein that may be developed and offered by Contractor in order for such Equipment to remain compliant with applicable laws and regulations. County shall also be solely responsible for the cost of any third party items that are required in order for the Equipment and/or Software to remain compliant with applicable laws and regulations.

6. **State Recertifications.** In the event that any future state certifications or recertifications are required that are not otherwise required as a result of any changes or modifications voluntarily made by

Contractor to the Software and/or Equipment licensed and sold hereunder, County shall be responsible for:

(i) the total cost of any third party items that are required in order for the Equipment and/or Software to remain certified;

(ii) County's pro-rata share of such future state certification or recertification costs; and

(iii) County's pro-rata share of the costs of designing, developing, manufacturing and/or certification by applicable federal and state authorities of any mandated modifications to the Equipment and/or Software that may result from such future state certifications or recertifications.

County's pro-rata share of the costs included under subsections 6(ii) and 6(iii) above shall be determined at the time by dividing the number of registered voters in County's jurisdiction by the total number of registered voters in all counties in County's state to which Contractor has sold and/or licensed the Equipment and/or Licensed Software purchased and licensed by County under this Contract.

7. **Proprietary Rights.** County acknowledges and agrees as follows:

a. Contractor owns the Contractor Software, all Documentation and training materials provided by Contractor, the design and configuration of the Contractor Equipment and the format, layout, measurements, design and all other technical information (except for County supplied information such as election information) associated with the ballots to be used with the Contractor Equipment. County has the right to use the aforementioned items to the extent specified in this Contract. Contractor also owns all patents, trademarks, copyrights, trade names and other proprietary or intellectual property in, or used in connection with, the aforementioned items. The aforementioned items also contain confidential and proprietary trade secrets of Contractor that are protected by law and are of substantial value to Contractor.

b. County shall not cause or permit the adaptation, conversion, reverse engineering, disassembly or decompilation of any of the Contractor Equipment or Contractor Software.

c. County shall keep the Contractor Software and related Documentation free and clear of all claims, liens and encumbrances and shall maintain all copyright, trademark, patent or other intellectual or proprietary rights notices that are set forth on the Contractor Equipment, the Contractor Software, the Documentation, training materials and ballots that are provided, and all permitted copies of the foregoing.