

## **HART SYSTEM 6**

### **HART INTERCIVIC**

#### **SYSTEM 6.1:**

**Ballot Now, version 3.2.4**

**BOSS, version 4.2.13**

**Rally, version 2.2.4**

**Tally, version 4.2.8**

**SERVO, version 4.1.6**

**eScan, version 1.2.0**

**JBC, version 4.1.3**

**eSlate/DAU, version 4.1.3**

**VBO, version 1.7.5**

**eCM Manager, version 1.1.7**

### **Staff Review and Analysis**

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Voting Systems Technology Assessment**

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## **I. SUMMARY OF THE APPLICATION**

Procedures, hardware, firmware and software developed by Hart Intercivic for use with the System 6.1 voting system, comprised of the following components: eScan, version 1.2.0; JBC, version 4.1.3; eSlate/DAU, version 4.1.3; VBO, version 1.7.5; eCM Manager, version 1.1.7; Ballot Now software, version 3.2.4; BOSS software, version 4.2.13; Rally software, version 2.2.4; Tally software, version 4.2.8; and SERVO, version 4.1.6.

## **II. SUMMARY OF THE SYSTEM**

The application for System 6.1 consists of ten components.

### **1. BOSS (Ballot Origination Software System), v. 4.2.13**

Boss is a Windows-based software application that is used to define and configure an election, including districts, precincts, contests, parties, and candidates. Once an election is defined within the application, BOSS is used to define and format the ballot layouts, including rotation, for all ballot styles for use with Ballot Now, eScan and the JBC/eSlate voting equipment.

The previous version of BOSS, version 3.5.4, was last certified as part of Hart System 3.4 on September 17, 2004. Changes between the current version and the previously certified version of BOSS include:

- capability for users to customize ballot headers for primary elections,
- support for the new VBO AVVPAT device,
- removed default password and added support for new system security requirements,
- bug fixes and performance enhancements, and
- features for other states that are not used in California.

### **2. Ballot Now, v. 3.2.4**

Using the ballot definition data created by BOSS, the Ballot Now software allows the jurisdiction to print its own ballots, for all ballot styles, on approved ballot stock. Once the voter returns their marked ballot, Ballot Now can use a third-party scanner for capturing electronic images of the paper ballot. Ballot Now then applies voting logic to the digital image and extracts the cast vote record. The Ballot Now logic also provides a jurisdiction with the ability to view ballot images and resolve write-ins, as well as to interpret and resolve improperly marked ballots. The collected vote results can then be written to the Hart systems transport media, the MBB (Mobile Ballot Box), for export to Tally for tabulation.

The previous version of Ballot Now, version 2.3, was last certified as part of Hart System 3.4 on September 17, 2004. Changes between the current version and the previously certified version of Ballot Now include:

- improved efficiency of ballot resolution
- support for printing and scanning ballots for the eScan
- support for new scanners via a firewire interface
- enhanced security features
- enhanced support for primary elections (ballots printed by party, party filter for ballot resolution and party information on reports)
- increase on ballot sheet limit from four to nine sheets
- bug fixes and performance enhancements, and
- features for other states that are not used in California.

### **3. eScan, v. 1.2.0**

The eScan is a precinct-based ballot scanner and tabulator. It accepts ballots of different sizes, ranging from 8 ½” x 11” to 8 ½” x 20”, printed single-sided or double-sided. Ballots can be fed into the eScan with any orientation. Unlike conventional optical scan tabulators, the eScan captures a digital image of the entire ballot and then resolves the vote choices from within that image. The eScan will provide warning of over-voted contest on a ballot. Optionally, it can provide warning for undervoted ballots as well.

The base of the eScan serves as a ballot box, with two compartments. The first contains the ballots scanned through the eScan. The second holds “emergency” ballots deposited through a slot in the box should there be an interruption of power.

Ballot images and vote results are saved to an MBB for export to Tally.

The eScan is a new product to California and was not included in the previous certified version of this voting system.

### **4. eSlate, v. 4.1.3 with DAU (Disability Access Unit)**

The eSlate is a Direct Record Electronic (DRE) voting device. It features a large LCD screen for display of the ballot. A wheel device allows the voter to scroll through the ballot options on the screen and an “Enter” button is used to make a choice. Additional buttons allow the voter to move forward and backward one page, and to finalize the ballot.

The eSlate sits in a custom voting booth that features a built-in privacy screen.

The eSlate must be connected to a JBC (Judge’s Booth Controller) to receive ballot instructions and to save voted ballot choices. Multiple eSlates can be daisy-chained together for operation in a polling place.

The DAU provides support for voters with disabilities. With headphones attached, the eSlate can provide audio instruction so blind voters can privately and independently cast ballots. (It should be noted that the eSlate screen cannot be blanked when blind voters use the audio voting mode.) The eSlate also features high-contrast and enlarged font mode for persons with visual acuity disabilities. Optional tactile input switches (“jelly switches”) can be attached for voters with mobility impairments. Finally, the DAU supports an interface for sip-puff devices. With the addition of the VBO AVVPAT device, the eSlate tablet can no longer be temporarily removed from the booth for curbside voting. Instead, the entire booth, complete with tablet and VBO, must be disconnected from the JBC and transported out to the voter.

The previous version of the eSlate, version 2.3.8, was last certified as part of Hart System 3.4 on September 17, 2004. Changes between the current version and the previously certified version of the eSlate include:

- support for the VBO AVVPAT device
- added display of the public counter to the voter code screen
- improvements to the audio instructions as recommended by the National Federation of the Blind
- support for provisional ballots
- bug fixes and performance enhancements, and
- features for other states that are not used in California.

## **5. VBO (Verifiable Ballot Option), v. 1.7.5**

The VBO is Hart’s Accessible, Voter-Verified Paper Audit Trail for the eSlate DRE device. The VBO is a reel-to-reel device that mounts onto the eSlate voting booth beside the eSlate tablet itself. It features a thermal printer that prints to a 4”-wide roll of paper. The VBO can be programmed to print ballot images in various font sizes. In accordance with California requirements, the VBO allows the voter to view and reject his or her ballot twice before automatically finalizing the ballot on the third try.

Should a VBO experience a paper jam or otherwise malfunction in a polling place on Election Day, the VBO is designed to be swapped out in its entirety as a sealed unit to preserve the record and secrecy of the vote.

The VBO is a new product to California and was not included in the previous certified version of this voting system.

## **6. JBC (Judge’s Booth Controller), v. 4.1.3**

The JBC is the heart of the eSlate precinct voting system. The JBC can control up to twelve eSlate voting units, providing instructions to, monitoring activity on and recording vote results captured from the eSlates.

The JBC features an LCD screen for instructions and messages to the poll workers, as well as display of the public and private counters for the voting system. Once a

voter's eligibility has been determined, a poll worker uses the keypad on the JBC to select the voter's precinct and party. The JBC then issues a slip of paper bearing a four-digit numeric code. The voter then inputs this code into any of the connected eSlate devices to activate the correct ballot style for that voter. Prior to opening the polls, the JBC's self-contained printer prints a zero-tape to demonstrate this system is clear and ready for voting to begin. At the close of the polls, the JBC can print a results tape and audit log in that same manner. Finally, vote results from the polling place system are written to a MBB device for export to Tally.

The previous version of the JBC, version 2.3.8, was last certified as part of Hart System 3.4 on September 17, 2004. Changes between the current version and the previously certified version of the JBC include:

- support for all precincts in all locations on Election Day
- support for provisional ballots
- added soft key to the Polls Closed menu to all printing of Access Code Report
- bug fixes and performance enhancements, and
- features for other states that are not used in California.

#### **7. Rally, v. 2.2.4**

Rally is a Windows-based software application that reads and stores vote results from MBBs before relaying those results to the Tally application via local network or modem as unofficial canvas results. Communication between Rally and Tally is password protected and is further protected by SSL (Secure Sockets Layer) security keys. Rally is typically deployed in a geographically large jurisdiction to allow vote results to initially be gathered and relayed from remote locations to the central jurisdiction office.

The previous version of Rally, version 1.2.0, was last certified as part of Hart System 3.4 on September 17, 2004. Changes between the current version and the previously certified version of Rally include:

- updated security to force creation of unique database password at installation and SSL certification at first logon.
- removed default application user

#### **8. Tally, v. 4.2.8**

Tally is a Windows-based software application that reads, stores and tabulates the ballot images from the MBBs. Tally is initialized with the finalized BOSS database that was used to create and configure the election. As votes results are accumulated, Tally can be used to resolve write-in votes and provisional ballots. If a provisional ballot is cast in the wrong precinct on the wrong ballot style, Tally automatically applies the eligible vote selections to the correct ballot, in accordance with California

law. Finally, Tally offers a wide range of flexible reports including canvass results, audit trails, polling place status and MBB status.

The previous version of Tally, version 3.2.0, was last certified as part of Hart System 3.4 on September 17, 2004. Changes between the current version and the previously certified version of Tally include:

- capability to resolve write-in images received from a MBB
- added support for parsed provisional ballots
- added reports for provisional ballots
- updated security to force creation of unique database password at installation and SSL certification at first logon.
- removed default application user
- bug fixes and performance enhancements, and
- features for other states that are not used in California.

#### **9. SERVO (System for Election Records & Verification of Operations), v. 4.1.6**

Servo is a Windows-based software application that serves as an election records and recount management system for the Hart voting system.

Prior to an election, SERVO resets the eSlates, JBCs and eScans to clear all previously recorded information (except the private counter) in preparation for the upcoming election. SERVO also programs the election's security keys into the JBCs and eScans.

At the conclusion of the election, SERVO records copies of the vote results directly from the JBCs and eScans to provide an additional back-up of the election data, as well as to provide a cross-verification of canvass results for a recount, and to maintain an ongoing equipment history.

The previous version of SERVO, version 2.0.10, was last certified as part of Hart System 3.4 on September 17, 2004. Changes between the current version and the previously certified version of Tally include:

- added security features: support for the eCM cryptographic module; forced creation unique database password at installation; firmware verification; password complexity tests; and audit logging of security events
- added support to reporting for provisional ballots and parties
- support for the new eScan device
- bug fixes and performance enhancements, and
- features for other states that are not used in California.

## **10. eCM Manager, v. 1.1.7**

eCM Manager is a software application that reads and writes a Key ID and password to an eCM (eSlate Cryptographic Module), a physical Spyus USB security key that is required for access to secure functions in the BOSS, Ballot Now, Rally, Tally and SERVO applications. This system allows jurisdictions to create a unique cryptographic key for each election.

The VBO is a new product to California and was not included in the previous certified version of this voting system.

# **III. TESTING INFORMATION AND RESULTS**

## **1. Federal Testing**

Wyle Laboratories has successfully completed federal qualification testing of the eScan, firmware v. 1.2.0, the JBC, firmware v. 4.1.3, the eSlate, firmware v. 4.1.3 and the VBO, firmware v. 1.7.5 to the 2002 Federal Voting System Standards. We have received a copy of the draft report from that testing, dated January 11, 2006. A final report must be received from Wyle upon report acceptance from NASED and prior to State certification of this system.

Ciber, Inc. has successfully completed federal qualification examination and review of all software components System 6.0, as well as end-to-end testing of the entire system, to the 2002 Federal Voting System Standards. We have received a copy of the draft report from that testing, dated January 13, 2006. During the week of December 26, 2005, modifications to the system were submitted to CIBER for review. These modifications revise the system number to 6.1. We have received written notice from Ciber that testing of these modifications to the 2002 Voting System Standards were successfully completed and are awaiting draft copies of that report from the ITA.

Final reports must be received from both ITAs upon report acceptance from NASED and prior to State certification of this system.

Federal qualification of the system by NASED is still pending and must be issued prior to State certification of this system.

## **2. State Testing by the Secretary of State and Consultant**

### **Testing Overview**

State examination and functional testing of this system was conducted by Secretary of State staff in conjunction with the State's technical consultants, Mr. Steve Freeman and Mr. Paul Craft, at the Hart Intercivic office in Lafayette, Colorado from December 12<sup>th</sup> through December 16<sup>th</sup>, 2005. Because the State testing of the system was not completed during this period, additional State testing was conducted at the Hart office in Lafayette from February 1<sup>st</sup> through 3<sup>rd</sup> by the State's technical consultants, Mr. Steve Freeman and Mr. Paul Craft, together with Secretary of State staff.

The test plans for those examinations is included as an appendix to this document.

On February 21<sup>st</sup> and 22<sup>nd</sup>, 2006, a volume test of both the eScan and the eSlate was conducted by the State's technical consultants and Secretary of State staff at the Orange County Registrar of Voters' Office in Santa Ana, California.

### **General Testing Results**

Testing of the Hart Intercivic System 6.1 was generally completed successfully. During that testing, installation of the trusted software build was verified. Sufficient ballots were processed for the standard state primary and general test elections to verify features of the system, as well as to test the system's capability to conduct elections in accordance with California law.

However, during testing the following issues were noted:

1. Hart literature refers to three vendor-developed utilities that were not included in the application for State certification and not included in the federal ITA testing and review: Fusion, Trans and Bravo. Because the Secretary of State has determined that they fall under the definition of voting systems under California law, these utilities cannot be used without examination and State certification.
2. Ballot Now has the capability to print a unique ballot ID number in plain text and in barcode on each ballot. The vendor explained this feature was included to prevent a ballot from being counted multiple times. California law requires that ballots with unique markings that can be individually identified cannot be counted and must be voided. During testing, we were able to verify that Ballot Now has an option to disable printing of the unique Ballot ID. Although the barcode remains on the ballot, it is no longer unique to any particular ballot. Use Procedures for this system must require that this unique ballot ID assignment tool be disabled when the system is used in California.
3. Similarly, during the initial testing of the system in December, it was determined that the VBO AVVPAT for the eSlate also printed a unique ballot ID number for each ballot in plain text and barcode on the paper audit trail. The vendor explained this could not be disabled on the VBO. During the week of December 26, 2005, the vendor submitted modifications to this system to the federal ITAs for review. These modifications included the capability to disable printing of the unique ballot ID on the VBO paper audit trail. This new functionality was confirmed and tested during the second phase of testing in February.
4. It was discovered during testing that an election must be finalized in BOSS before the election information can be exported to Ballot Now and the other applications. If a jurisdiction subsequently determines there is an error in election definition and logic, those errors cannot be corrected *without defining a new election and thereby voiding any ballots that have already been printed*. Further, *additional MBBs cannot be created once the election is finalized*. While this rigidity was designed into the system as a security feature of the Hart System 6, users of the system should exercise extreme care in proofing their election definition prior to finalizing the election. They should also create sufficient extra MBBs to serve

their potential needs should any unforeseen emergency arise during the election that would require new systems to be deployed.

5. The Ballot Now system allows a jurisdiction to generate and print “test ballots” for use in logic and accuracy testing of the system. These ballots are counted in a separate test mode, separate from the actual memory and logic that is used to tabulate live ballots. In fact, on the eSlate, the results of testing can only be printed from the eSlate printer – they cannot be saved to memory. While the vendor explained that the election logic was identical for both the test mode and the election mode, this could not be verified.
6. It was determined during testing that when the eSlate is in audio ballot mode for visually impaired voters, the eSlate screen display cannot be blanked. This raises the possibility of undetected, third-party observation of the votes being cast on the ballot. Use Procedures for this system must address a means of preventing this violation of secret voting and assuring ballot privacy for visually impaired voters until this design is corrected in a future version of the system.
7. During testing, it was discovered that the ballot review for the audio ballot mode does not allow the voter to review the actual write-in candidate name that the voter has written in and selected. This should be corrected in future versions of the system.
8. Although the original eSlate allowed curbside voting by removing the small, lightweight eSlate tablet from the voting booth, with the addition of the VBO AVVPAT to the eSlate, this is no longer possible. Curbside voting can now only be supported by taking the entire voting booth to the voter. It should be noted that the entire voting booth with the eSlate and the VBO weighs approximately forty pounds.
9. Although the VBO supports larger font sizes that are easily readable, using the larger font resulted in truncation of longer contest and candidate names of the AVVPAT audit trail. This should be corrected in future versions of the system.
10. The results tapes printed in the precinct by the JBC and the eScan are not capable of printing over-vote and under-vote counts for each contest. This should be corrected in future versions of the system.
11. The vendor-recommended procedures for acceptance testing of the eSlate specify only casting one test ballot on each eSlate unit. The recommended procedures for acceptance testing of the eScan specify only casting two ballots on each eSlate – one voted ballot and one blank ballot. This seems inadequate, particularly in light of the volume test results noted below. The vendor should specify in the official Use Procedures an adequate number of ballots to be cast to allow the jurisdiction to effectively determine the reliable operational ability of the equipment they have purchased.

## **Volume Testing Results**

The Secretary of State staff and technical consultants Steve Freeman and Paul Craft conducted the volume test of the Hart eScan and the eSlate on February 21<sup>st</sup> and 22<sup>nd</sup>, 2006, at the Orange County Registrar of Voters' warehouse. On Tuesday, February 21<sup>st</sup>, testing began on fifty eScan units, but testing was suspended around noon due to a shortage of available ballots for testing. After lunch, the testing began on one hundred eSlates equipped with the VBO AVVPAT. On Wednesday, February 22<sup>nd</sup>, the testing was first resumed and completed on the eScans, and then resumed and completed on the eSlates.

The volume tests were conducted in accordance with the Secretary of State's standard protocol for volume testing. (This protocol may be obtained from the Secretary of State website at: [http://www.ss.ca.gov/elections/elections\\_vs.htm](http://www.ss.ca.gov/elections/elections_vs.htm)) Approximately fifty temporary contract workers were hired by the Secretary of State to perform the testing. All testing was directly observed by Secretary of State staff. Finally, the overall testing environment was recorded continuously on videotape.

All errors were documented, whether they were attributed to the equipment or to human performance. At the discretion of the test director, specific errors were documented with either photographs or videotape, or both. Generally, successive errors of the same type were not documented in such detail once their initial instances had been captured.

#### *eScan Volume Test*

A total of sixty-one errors were logged during the eScan volume test. All but two of those errors were related to the actual performance of the eScan equipment.

Twenty-one eScans experienced a total of twenty-six incidents where the eScan locked up and refused to accept ballots. In these instances, the screen displayed the error message: "Alert Code 0x: 32768. In three instances, the error message referred to the file CmsVoterBad.cpp, line 177. In one instance, the error message referred to the file CmsVoterScan.cpp, line 322. In the remaining twenty-two instances, the error message referred to file ScannerTask.cpp, line 113. In all twenty-six instances of this error, the eScan needed to be shut down and restarted, after which voting resumed normally. The vendor has advised that preliminary research indicates the errors are related to errors in feeding the ballot into the eScan (either from being fed skewed or pulled back once ballot intake has begun). In any event, these errors were not handled gracefully by the operating system and required power cycling of the eScan.

On four occasions, the eScan rejected a ballot with error code #210. The vendor explained this error message meant the ballot had already been scanned. It should be noted that the vendor was given permission to print ballot id numbers on the test deck ballots to insure accuracy in testing. This is not normally allowed in California. In each instance, the voter was carefully questioned and insistent that they had not removed a ballot from the ballot box and rescanned it. The vendor did acknowledge that there was a possibility that duplicate serial numbers might have been an artifact from the way the ballots were printed. Due to the prohibition on printing ballot ID numbers on California ballots, this error is unlikely to occur in California polling places.

There were eighteen incidents of a ballot jamming in the eScan. In at least five of these incidents, the jam could only be cleared by unlocking and opening the ballot box to pull loose the jammed ballot. It should be noted that the State's technical consultant believes it is likely that the incident rate for this was actually higher, but since he understood that opening the ballot box was the required procedure for clearing these jams, he stopped noting this step on his error reports. In the remaining ballot jam instances, the jam was cleared by lifting the scanner cover and pulling the jammed ballot loose. In most instances, the ballot was successfully rescanned. However, in one instance the rescanned ballot was subsequently rescanned and rejected with the error code #210 (ballot already scanned). This presents a dilemma because a) the message is not clear to the voter that the ballot had been read and 2) there is no means to insert the ballot back into the ballot box without unlocking and opening the ballot box. It should also be noted that for the remainder of these jams, there was no error message indicating the nature of the jam or whether the ballot had been successfully scanned.

On nine occasions the eScan refused the ballot and returned it to the voter. In all but one of these instances, the error code "ESN-200" was displayed. The vendor has indicated this code stands for "bad box" (a vote position on the ballot that hadn't registered correctly). In these instances, the ballot was successfully resubmitted and accepted. In the final instance, the ballot was rejected three times before being accepted, successively showing the error code ESN-201, then ESN-200, then ESN-201. Per the vendor, ESN-201 represents "bad form". Again, there is no clear message to the voters to understand what is going on with their ballot and what action they should take.

Finally, there were two errors recorded and attributed to human errors that were an artifact of the test. In one instance, the eScan rejected the ballot because the voter had inadvertently tried to scan two ballots simultaneously. In the second instance, a ballot was mistakenly taken from one machine's test deck and scanned in a different machine.

The Office of Voting Systems Technology Assessment does not recommend certification of the eScan at this time due to the following significant errors encountered in volume testing:

- 42% of the machines experienced an error condition at least once that could not be handled by the operating system and required the eScan to be rebooted
- Many incidents of ballot jams on this machine require the ballot box to be unlocked and opened to clear the jam. This is an unacceptable security risk in a polling place on Election Day and should never occur.
- On jammed ballots, there is no clear ballot status indicator informing the voters or the poll workers about whether or not the ballot has been scanned and counted.

Additionally, the use of cryptic, unexplained numeric codes is likely to undermine voter confidence when they have problems with their ballots and can't determine themselves what the cause of the error is or how it should be resolved.

Once the vendor has corrected these problems, the eScan should be resubmitted for volume testing to confirm the resolution.

### eSlate Volume Test

A total of thirty-four errors were logged during the eSlate volume test. Twenty-four of those errors were related to the actual performance of the eSlate equipment.

During testing, four eSlate units got stuck in some kind of an error cycle that could not be exited. Generally this occurred when trying to cast the ballot. At the time of saving the ballot, the VBO would print "ballot cancelled" repeatedly on the audit record and the screen controls would freeze. After rebooting the machine, the same symptoms reappeared on the next attempt to cast a ballot. The vendor initially hypothesized that a defective power adaptor or connector for the power adaptor caused the problem. After swapping out the adaptors, two machines were retested and exhibited the same problems. All four machines were taken out of service and not tested further. It should be noted that all four of these exhibited these symptoms within the first five ballots, indicating the possibility that this is a manufacturing problem that can be detected with robust acceptance testing. We are awaiting further explanation from the vendor as to the cause of this problem.

There were seventeen incidents of problems with the VBO AVVPAT printer. In one incident, the eSlate locked and displayed the error message "EVBO-101" The vendor explained this error code represents a printer battery error. This VBO was opened and the batteries were disconnected, after which voting resumed normally on the eSlate. In a second incident, the eSlate locked with the printer error "EVBO-103." The vendor explained this error code represents a printer communication error. This VBO was swapped out and taken out of service in accordance with the Use Procedures for this system.

In the remaining fifteen occasions of VBO errors, the eSlate locked up with the screen displaying cryptic error message: "Printer error EVBO-102". Per the vendor, this error code represents an out-of-paper condition in the VBO. In two cases (incidents #32 & 34), this was correct - the VBO was out of paper. In the thirteen remaining instances, this was a false out-of-paper error. In each case, the vendor was able to correct this by removing and disassembling the VBO, and then advancing the paper, after which voting resumed normally on the eSlate without further errors. In all such cases, the error was triggered within the first ten ballots. It should be noted that the VBO is designed to not be opened in the polling place, and if any issues arise, to be swapped out and replaced with a new unit.

Overall, there were seventeen instances out of 100 eSlates that would have required the replacement of a VBO in a polling place. Should this system be certified, use procedures should require an appropriate number of VBO replacements to be on hand in each polling place.

The remaining ten incidents were all attributed to human error:

- In one case, the assigned activation code for a ballot timed out before the voter could use the code.
- In five cases, the voter was issued an activation code for the wrong ballot style.

- In four cases, the error was attributed to voter confusion on the test process or operation of the eSlate.

Based on the volume test results for the eSlate, the Office of Voting Systems recommends that if this system is certified, the Use Procedures should specify:

- robust acceptance testing procedures that will identify any defective units subject to the error cycle/lockout problem that caused the four units in the volume test to be taken out of service
- an adequate supply of replacement VBO units on hand at each polling place to ensure that there is no downtime of eSlates due to VBO failures

Further, as soon as possible the vendor should a) resolve the problem that causes the VBO to falsely indicate a low paper condition at the start of the role, and b) replace the cryptic error codes on the eSlate with plain-text, understandable error messages that communicate to the voter and the poll worker what the problem is, how to resolve the problem and the status of that voter's ballot. These must be accomplished as soon as possible to enhance voter confidence in this system.

#### **IV. COMPLIANCE WITH STATE AND FEDERAL LAWS AND REGULATIONS**

The Secretary of State of California has developed and promulgated a procedure for approving, certifying, reviewing, modifying, and decertifying voting systems, vote tabulating systems, election observer panel plans, and auxiliary equipment, materials and procedures.

Four sections of this procedure, Sections 103, 104, 504, and 601, describe in detail the requirements any voting system must meet in order to be approved for use in California elections. These sections are described in detail and the system is analyzed for compliance in this Administrative Review and Analysis of the system.

**1. §103 (a) (1): The machine or device and its software shall be suitable for the purpose for which it is intended.**

The system meets this requirement except as noted under Section III. As noted, these exceptions can and should be addressed in the system's Use Procedures and in future revisions to the system.

**2. §103 (a) (2): The system shall preserve the secrecy of the ballot.**

The system meets this requirement as long as a) the unique ballot ID is not printed on the paper ballots or the VPO audit trail and b) procedures are in place to prevent observance of the ballot while blind voters are voting on the eSlate in audio mode.

**3. §103 (a) (3): The system shall be safe from fraud or manipulation.**

The system meets this requirement.

4. **§103 (a) (4): The system shall be auditable for the purposes of an election recount or contest procedure.**

The system meets this requirement.

5. **§103 (a) (5): The system shall comply with all appropriate federal and California laws and regulations.**

The system meets this requirement.

6. **§103 (a) (6): The system shall have been certified, if applicable, by means of qualification testing by a Nationally Recognized Test Laboratory (NRTL) and shall meet or exceed the minimum requirements set forth in the Performance and Test Standards for Punch Card, Mark Sense, and Direct Recording Electronic Voting Systems, or in any successor voluntary standard document, developed and promulgated by the Federal Election Commission.**

The system has successfully completed federal qualification testing to the 2002 Federal Voting System Standards.

7. **§103 (b): In addition to the requirements of subdivision (a) of this section, voting systems, procedures, and equipment approved and certified by the Secretary of State shall promote accessible voting opportunities for persons with physical disabilities.**

The eSlate with the DAU features an audio voting mode for blind voters, high contrast and enlarged fonts for voters with visual acuity disabilities and either sip-puff or binary tactile switches for voters with mobility impairments.

8. **§104 (a): Certification consists of three separate levels of testing: qualification, certification and acceptance.**

Federal qualification testing has been successfully completed on this system. A NASED qualification number is anticipated, but has not yet been issued. The system cannot be certified until that number is issued.

Staff in conjunction with a technical consultant to the Secretary of State successfully performed state certification testing.

The county elections official will conduct acceptance testing as each county takes receipt of the system. Procedures for that acceptance testing are specified in the official Use Procedures.

9. **§104 (b): Certification tests shall include functional tests and qualitative assessment to ensure that the system operates in a manner that is acceptable under federal and state law and regulations.**

It is the opinion of the State's expert technical consultants that the scope of the certification test was adequate to make basic recommendations and observations about the logical accuracy, some user friendliness issues, and compliance with state law.

**10. §104 (c): Certification tests shall enhance public confidence by assuring that the system protects the secrecy of the ballot and the security of the voting process, and records and counts votes accurately.**

In the tests performed, this system recorded and counted votes accurately. With the procedures noted above, the secrecy of the ballot is protected for all voters.

**11. §104 (d): Certification tests shall promote public confidence that the system is easy to use or 'voter friendly.'**

Certification testing of the system included evaluation of the user interfaces. The examiners found the system to be as easy to use as existing certified systems.

**12. §104 (e): Certification testing shall demonstrate that the system creates an audit trail showing both that the voter was able to vote for the candidate or for or against a measure of his or her choice and that the system correctly and consistently interpreted the voter's votes.**

The system meets this requirement. The eScan provides warning to the voter if a ballot is mistakenly over-voted in a contest. With the addition of the VBO, the eSlate allows voters to verify the proper recording of their vote choices before casting their ballot. The paper ballots themselves are an audit trail of the voter's intent on Ballot Now and the eScan. For the eSlate DRE, the VBO features a paper audit trail of all votes cast. Finally, all votes cast in the State testing were accurately recorded and tabulated.

**13. §504: The Evaluation shall include a review of California Elections Code sections, which address the application.**

A review of the appropriate Elections Code sections was conducted.

**§15360. During the official canvass of every election in which a voting system is used, the official conducting the election shall conduct a public manual tally of the ballots tabulated by those devices cast in 1 percent of the precincts chosen at random by the elections official. If 1 percent of the precincts should be less than one whole precinct, the tally shall be conducted in one precinct chosen at random by the elections official.**

**In addition to the 1 percent count, the elections official shall, for each race not included in the initial group of precincts, count one additional precinct. The manual tally shall apply only to the race not previously counted.**

The system meets this requirement.

**§19300 permit the voter to vote for all the candidates of one party or in part for the candidates of one party and in part for the candidates of one or more other parties.**

The system meets this requirement.

**§19301. A voting machine shall provide in the general election for grouping under the name of the office to be voted on, all the candidates for the office with the designation of the parties, if any, by which they were respectively nominated.**

**The designation may be by usual or reasonable abbreviation of party names.**

The system meets this requirement.

**§19302. The labels on voting machines and the way in which candidates' names are grouped shall conform as nearly as possible to the form of ballot provided for in elections where voting machines are not used.**

The system meets this requirement.

**§19303. If the voting machine is so constructed that a voter can cast a vote in part for presidential electors of one party and in part for those of one or more other parties or those not nominated by any party, it may also be provided with: (a) one device for each party for voting for all the presidential electors of that party by one operation, (b) a ballot label therefore containing only the words "presidential electors" preceded by the name of the party and followed by the names of its candidates for the offices of President and Vice President, and (c) a registering device therefore which shall register the vote cast for the electors when thus voted collectively.**

**If a voting machine is so constructed that a voter can cast a vote in part for delegates to a national party convention of one party and in part for those of one or more other parties or those not nominated by any party, it may be provided with one device for each party for voting by one operation for each group of candidates to national conventions that may be voted for as a group according to the law governing presidential primaries.**

**No straight party voting device shall be used except for delegates to a national convention or for presidential electors.**

The system complies with these requirements.

**§19304. A write-in ballot shall be cast in its appropriate place on the machine, or it shall be void and not counted.**

The system complies with these requirements.

**§19320.** Before preparing a voting machine for any general election, the elections official shall mail written notice to the chairperson of the county central committee of at least two of the principal political parties, stating the time and place where machines will be prepared. At the specified time, one representative of each of the political parties shall be afforded an opportunity to see that the machines are in proper condition for use in the election.

The party representatives shall be sworn to perform faithfully their duties but shall not interfere with the officials or assume any of their duties. When a machine has been so examined by the representatives, it shall be sealed with a numbered metal seal. The representatives shall certify to the number of the machines, whether all of the counters are set at zero (000), and the number registered on the protective counter and on the seal.

The system meets this requirement.

**§19321.** The elections official shall affix ballot labels to the machines to correspond with the sample ballot for the election. He or she shall employ competent persons to assist him or her in affixing the labels and in putting the machines in order. Each machine shall be tested to ascertain whether it is operating properly.

The system meets this requirement.

**§19322.** When a voting machine has been properly prepared for an election, it shall be locked against voting and sealed. After that initial preparation, a member of the precinct board or some duly authorized person, other than the one preparing the machines, shall inspect each machine and submit a written report. The report shall note the following: (1) Whether all of the registering counters are set at zero (000), (2) whether the machine is arranged in all respects in good order for the election, (3) whether the machine is locked, (4) the number on the protective counter, (5) the number on the seal. The keys shall be delivered to the election board together with a copy of the written report, made on the proper blanks, stating that the machine is in every way properly prepared for the election.

The system meets this requirement.

**§19340.** Any member of a precinct board who has not previously attended a training class in the use of the voting machines and the duties of a board member shall be required to do so, unless appointed to fill an emergency vacancy.

The system meets this requirement.

**§19341.** The precinct board shall consist of one inspector and two judges who shall be appointed and compensated pursuant to the general election

**laws. One additional inspector or judge shall be appointed for each additional voting machine used in the polling place.**

The system meets this requirement.

**§19360. Before unsealing the envelope containing the keys and opening the doors concealing the counters the precinct board shall determine that the number on the seal on the machine and the number registered on the protective counter correspond to the numbers on the envelope.**

**Each member of the precinct board shall then carefully examine the counters to see that each registers zero (000). If the machine is provided with embossing, printing, or photography devices that record the readings of the counters the board shall, instead of opening the counter compartment, cause a “before election proof sheet” to be produced and determined by it that all counters register zero (000).**

**If any discrepancy is found in the numbers registered on the counters or the “before election proof sheet” the precinct board shall make, sign, and post a written statement attesting to this fact. In filling out the statement of return of votes cast, the precinct board shall subtract any number shown on the counter from the number shown on the counter at the close of the polls.**

The system meets this requirement.

**§19361. The keys to the voting machines shall be delivered to the precinct board no later than 12 hours before the opening of the polls. They shall be in an envelope upon which is written the designation and location of the election precinct, the number of the voting machine, the number on the seal, and the number registered on the protective counter. The precinct board member receiving the key shall sign a receipt.**

**The envelope shall not be opened until at least two members of the precinct board are present to determine that the envelope has not been opened.**

**At the close of the polls the keys shall be placed in the envelope supplied by the official and the number of the machine, the number written on the envelope.**

The system meets this requirement.

**§19362. The exterior of the voting machine and every part of the polling place shall be in plain view of the election precinct board and the poll watchers.**

**Each machine shall be at least four feet from the poll clerk’s table.**

The system meets this requirement.

**§19363.** Voters shall not remain in or occupy the booths or compartments longer than is necessary to mark their ballots, which shall not exceed five minutes. However, where no other voter would be inconvenienced, a longer period shall be allowed.

The system meets this requirement.

**§19370.** As soon as the polls are closed, the precinct board, in the presence of the watchers and all others lawfully present, shall immediately lock the voting machine against voting and open the counting compartments, giving full view of all counter numbers. A board member shall in the order of the offices as their titles are arranged on the machine, read and distinctly announce the name or designating number and letter on each counter for each candidate's name and the result as shown by the counter numbers. He or she shall also in the same manner announce the vote on each measure.

If the machine is provided with a recording device, in lieu of opening the counter compartment the precinct board shall proceed to operate the mechanism to produce the statement of return of votes cast record in a minimum of three copies, remove the irregular ballot, if any, record on the statement of return of votes cast record. The irregular ballot shall, be attached to the statement of result record of votes cast for the machine and become a part thereof. One copy of the statement of return of votes cast for each machine shall be posted upon the outside wall of the precinct for all to see. The statement of return of votes cast for each machine for the precinct shall constitute the precinct statement of result of votes cast.

The system meets this requirement.

**§19371.** Before adjourning, the precinct board shall seal the operating lever with the seal provided and lock the machine so that the voting and counting mechanism may not be operated.

It shall remain locked and sealed against operation until the time for filing a contest of election has expired, which shall not exceed a period of 30 days following the declaration of the result of the election by the body canvassing the returns.

Does not apply.

**§19380.** During the reading of the result of votes cast, any candidate or watcher who may desire to be present shall be admitted to the polling place. The proclamation of the result of the votes cast shall be distinctly announced by the precinct board who shall read the name of each candidate, or the designating number and letter of his or her counter, and the vote registered on the counter. The board shall also read the vote cast for and against each measure submitted. The board shall not count votes cast for write-in candidates, but shall have these counted by the elections official. During the

**proclamation, many opportunities shall be given to any person lawfully present to compare the result so announced with the counter dials of the machine, and any necessary corrections shall immediately be made by the precinct board, after which the doors of the voting machine shall be closed and locked.**

**If the machine is provided with a recording device, the alternate procedures in Section 19370 may be used.**

The system meets this requirement.

**§19381. In each election district where voting machines are used, statements of the results of the vote cast shall be printed to conform with the type of voting machine used.**

**The designating number and letter on the counter for each candidate shall be printed next to the candidate's name on the statements of result of the vote cast. Two such statements shall be used in each election district.**

The system meets this requirement.

**§19382. The statement of the result of votes cast, which shall be certified by the precinct board, shall contain:**

- (a) The total number of votes cast.**
- (b) The number of votes cast for each candidate and measure as shown on the counter.**
- (c) The number of votes for persons not nominated.**
- (d) Printed directions to the precinct board for their guidance before the polls are opened and when the polls are closed.**
- (e) A certificate, which shall be signed by the election officers before the polls are opened, showing:
  - (1) The delivery of the keys in a sealed envelope.**
  - (2) The number on the seal.**
  - (3) The number registered on the protective counter.**
  - (4) Whether all of the counters are set at zero (000).**
  - (5) Whether the public counter is set at zero (000).**
  - (6) Whether the ballot labels are properly placed in the machine.****
- (f) A certificate that shall be filled out after the polls have been closed, showing:
  - (1) That the machine has been locked against voting and sealed.**
  - (2) The number of voters as shown on the public counter.**
  - (3) The number on the seal.**
  - (4) The number registered on the protective counter.**
  - (5) That the voting machine is closed and locked.****

The system meets this requirement.

**§19383. A member of the precinct board shall enter the vote, as registered, on the statements of result of votes cast, in the same order on the space that has the same name or designating number and letter, after which another member shall verify the figures by calling them off in the same manner from the counters of the machine.**

**The counter compartment of the voting machine shall remain open until the official returns and all other reports have been fully completed and verified by the precinct board.**

**If the machine is provided with a recording device, the alternate procedures in Section 19370 may be used.**

The system meets this requirement.

**§19384. The precinct board shall, before it adjourns, post conspicuously on the outside of the polling place a copy of the result of the votes cast at the polling place. The copy of the result shall be signed by the members of the precinct board.**

**If the machine is provided with a recording device, the statement of result of vote's cast produced by operating its mechanism may be considered the "result of the votes cast" at the polling place.**

The system meets this requirement.

**§19385. The precinct board shall immediately transmit unsealed to the elections official a copy of the result of the votes cast at the polling place, the copy shall be signed by the members of the precinct board, and shall be open to public inspection.**

The system meets this requirement.

**§19386. Before proceeding to canvass the returns of an election at which voting machines have been used to register the votes cast, the board authorized to canvass returns shall open the counter compartment and compare the records of votes cast for the several candidates voted for and for and against the several measures voted upon shown on each machine with those recorded on the statement of results of votes cast prepared from that machine by the precinct board. Any errors found on the statement shall be corrected by crossing out the recorded incorrect number, and recording the correct number nearby.**

The system meets this requirement.

**14. §504 (b): A review of federal statutes or regulations, which address the application.**

**The Voting Rights Act of 1965, as amended (42 U.S.C. 1973), requires all elections in certain covered jurisdictions to provide registration and voting materials and oral assistance in the language of a qualified language minority group in addition to English. Currently in California, there are six VRA languages (Spanish, Chinese, Japanese, Vietnamese, Korean and Tagalog) as prescribed under the law.**

The system fully meets this requirement. Ballot Now can print paper ballots in any of the required languages. The eSlate can display the ballot in any of the required languages. Finally, the eSlate can be programmed to provide audio instruction through the DAU in any of the required languages.

**The National Voter Registration Act of 1993 (42 U.S.C. 1973gg and 11 CFR 8) allows for the casting of provisional ballots through Fail-Safe Voting procedures.**

The system meets this requirement. The JBC and the eSlates support casting a provisional ballot electronically for later resolution.

**The Voting Accessibility for the Elderly and Handicapped Act of 1984 (42 U.S.C. 1973ee through 1973ee-6) requires each political subdivision conducting elections within each state to assure that all polling places for federal elections are accessible to elderly and handicapped voters, except in the case of an emergency as determined by the state's chief election officer or unless the state's chief election officer: (1) determines, by surveying all potential polling places, that no such place in the area is accessible or can be made temporarily accessible, and (2) assures that any handicapped voter assigned to an inaccessible polling place will, upon advance request under established state procedures, either be assigned to an accessible polling place or be provided an alternative means of casting a ballot on election day.**

As noted above, the eSlate with DAU provides the following accessibility support for voters with disabilities:

- audio ballot instructions for blind voters
- high contrast display and enlarged fonts for voters with visual acuity problems
- sip-puff interface and tactile switches for voters with mobility issues

Finally, the entire eSlate voting booth can be temporarily disconnected and moved to the voter for curbside voting.

**The Retention of Voting Documentation (42 U.S.C. 1974 through 1974e) statute applies in all jurisdictions and to all elections in which a federal candidate is on a ballot. It requires elections officials to preserve for 22 months all records and papers which came into their possession relating to an application, registration, payment of a poll tax, or other act requisite to voting. Note: The US Department of Justice considers this law to cover all**

voter registration records, all poll lists and similar documents reflecting the identity of voters casting ballots at the polls, all applications for absentee ballots, all envelopes in which absentee ballots are returned for tabulation, all documents containing oaths of voters, all documents relating to challenges to voters or absentee ballots, all tally sheets and canvass reports, all records reflecting the appointment of persons entitled to act as poll officials or poll watchers, and all computer programs used to tabulate votes electronically. In addition, it is the Department of Justice's view that the phrase "other act requisite to voting" requires the retention of the ballots themselves, at least in those jurisdictions where a voter's electoral preference is manifested by marking a piece of paper or by punching holes in a computer card.

The system meets this requirement.

**15. 504 (c): A copy of the approved Qualification Test results released directly to the Secretary of State by a Nationally Recognized Test Laboratory (NRTL).**

Draft copies of the ITA reports have been received. Final copies of those reports will be secured before the system is certified.

**16. §504 (d): A review, if applicable, of transcripts or other materials from prior meetings or hearings on the proposed system, procedure, or modification, either in whole or in part.**

The relevant documentation has been reviewed.

**17. §504 (e): A review, if applicable, of any procedures manuals, guidelines or other materials adopted for use with the system addressed by the application.**

The proposed procedures for use and other relevant materials for this system have been reviewed. The system use procedures will not be finalized until final State certification of the system to allow for incorporation of any conditions that are imposed on the system as part of the certification.

**18. §504 (f): A review of any effect the application will have on the security of the election system.**

The application was reviewed for any potential effect on the security of the election system.

**19. §504 (g): A review of any effect the application will have on the accuracy of the election system.**

The system was tested by federal and state testers and deemed to record votes accurately.

**20. §504 (h): A review of any effect the application will have on the ease and convenience with which voters use the system.**

This system is no less voter-friendly than the existing Hart system. Further, this system adds the eScan to provide a voter warning of over-voted contest on the ballot.

It also adds the VBO AVVPAT to the eSlate DRE to provide voters an opportunity to verify their vote was accurately recorded before casting their ballot.

**21. §504 (i): A review of any effect the application will have on the timeliness of vote reporting.**

The proposed system will not delay the reporting of election results relative to the currently certified system.

**22. §504 (j): A review of any effect the application will have on the overall efficiency of the election system.**

The proposed system should have no effect on the overall efficiency of the election system.

**23. §504 (k): A Description of Deposit Materials showing that the Ballot Tally Software Source Code has been deposited in Escrow with an Escrow Company approved pursuant to Chapter 6, Division 7, Title 2 of the California Administrative Code, beginning with Section 20630.**

The vendor must deposit the source code in compliance with this requirement before this system can be used.

**24. §601: The Secretary of State shall not approve a proposed item without a finding that the item conforms to all applicable laws, procedures and regulations, including the right to a secret ballot, does not compromise the accuracy, security or integrity of the election process, nor interferes with the voter's ease and convenience in voting.**

As noted above, with procedures in place, the proposed system is at least as effective in maintaining the secrecy of the ballot, the accuracy, security and integrity of the elections process, and voter ease and convenience as the currently certified Hart system.

## **V. PUBLIC COMMENT**

On February 17, 2006, an "open house" style demonstration of this system was held at the Secretary of State headquarters for invited representatives of the accessibility community, as well as county elections officials and members of the VSTAAB, to observe and review this system with Secretary of State and vendor staff. Participants included:

- twelve elections staff representing six counties,
- eleven representatives of the accessibility community,
- one representatives of the VSTAAB, and
- various members of the Secretary of State staff.

Several participants in this event were asked to submit written comments on the system. While none have yet been received, all such comment will be submitted to the Secretary of State for his review.

## **VI. RECOMMENDATION**

Due to the problems encountered with the eScan during volume testing, Staff does not recommend certification of the eScan at this time. Once these problems have been resolved, the eScan should be submitted for volume testing to confirm their resolution.

Staff recommends certification of the remainder of the Hart Intercivic System 6.1 comprised of the following: JBC, version 4.1.3; eSlate/DAU, version 4.1.3; VBO, version 1.7.5; eCM Manager, version 1.1.7; Ballot Now software, version 3.2.4; BOSS software, version 4.2.13; Rally software, version 2.2.4; Tally software, version 4.2.8; and SERVO, version 4.1.6 with the following conditions:

1. A final version of the Use Procedures for the system is submitted to and approved by the Secretary of State. These Use Procedures must address all the issues raised in this report, including robust acceptance testing that will detect and remove any eSlate/VBO units that exhibit the lock-up problems encountered in the volume test.
2. No additional software developed by the Vendor other than that specifically listed in this certification shall be installed on any computer running any component of the Hart System 6.1 voting system.
3. No substitution or modification of the voting systems shall be made with respect to any component of the voting systems, including the Procedures, until the Secretary of State has been notified in writing and has determined that the proposed change or modification does not impair the accuracy and efficiency of the voting systems sufficient to require a re-examination and approval.
4. The Secretary of State reserves the right, with reasonable notice to Vendor and to the counties using any of the voting systems, to modify the Procedures used with any of the voting systems and to impose additional requirements with respect to the use of any of the systems if the Secretary of State determines that such modifications or additions are necessary to enhance the accuracy, reliability or security of any of the voting systems. Such modifications or additions shall be deemed to be incorporated herein as if set forth in full.
5. Any county using any voting system shall, prior to such use, file with the California Secretary of State a copy of its Election Observer Panel plan.
6. Pursuant to this (application, agreement, contract, etc.) and by order of the Secretary of State, voting systems certified for use in California shall comply with all applicable state and federal statutes, regulations, rules and requirements, including, but not limited to, those voting system requirements set forth in the California Elections Code and the Help America Vote Act of 2002, and those

requirements incorporated by reference in the Help America Vote Act of 2002, that are in effect as of the date of this (application, agreement, contract, etc). Further, voting systems shall also comply with all applicable state and federal voting system guidelines, standards, regulations and requirements that derive authority from or are promulgated pursuant to and in furtherance of the California Elections Code or the Help America Vote Act of 2002 or other applicable state or federal law when appropriate, that are in effect as of the date of this (application, agreement, contract, etc), including but not limited to, the 2002 Voting System Standards/Guidelines, developed by the Federal Election Commission and adopted by the Election Assistance Commission (EAC) and EAC Advisory 2005-004, dated July 20, 2005. This does not include future final court interpretations of existing state or federal law not in effect as of the date of this (application, agreement, contract, etc.).

7. Voting system manufacturers and/or their agents shall assume full responsibility for any representation that a voting system complies with all applicable state and federal requirements as referenced above. In the event such representation is determined to be false or misleading, voting system manufacturers or their agents shall be responsible for the cost of any upgrade, retrofit or replacement, of any voting system or its component parts, found to be necessary for certification or to otherwise be in compliance.
8. Any voting system purchased with funds allocated by the Secretary of State's Office shall meet all applicable state and federal standards, regulations and requirements, including, but not limited to, those voting system requirements as set forth in the California Elections Code and the Help America Vote Act of 2002 and those requirements incorporated by reference in the Help America Vote Act of 2002 that are in effect as of the date of this (application, agreement, contract, etc), including but not limited to, the 2002 Voting System Standards/Guidelines, developed by the Federal Election Commission and adopted by the Election Assistance Commission (EAC) and EAC Advisory 2005-004, dated July 20, 2005.
9. The vendor must establish a California County User Group and hold at least one annual meeting where all California users and Secretary of State staff are invited to attend and review the system and ensure voter accessibility.
10. In addition to depositing the source code in an approved escrow facility, the vendor must deposit a copy of the system source code and binary executables with the Secretary of State. The Secretary of State reserves the right to perform a full independent review of the source code.
11. The vendor must provide printing specifications for paper ballots to the Secretary of State. The Secretary of State will certify printers to print ballots for this system based upon their demonstrated ability to do so. The vendor may not require exclusivity in ballot printing and must cooperate fully in certification testing of ballots produced by other ballot printers.

## **Appendix A- Hart Intercivic System 6.1 Daily Testing Plan**

### **Monday (Dec 12) through Thursday (Dec 15)**

1. Review system modifications since last examination (Change Log)
2. Document testing platform (all equipment used in testing)
3. Verified installation of software
  - a. Verify virgin servers
  - b. Installation of software from trusted builds
  - c. Capture and document baseline
4. Verify test decks conform to State specifications
5. Review of system documentation (compare operating instructions and other documentation against actual system)
6. Prepare system for test primary election.

### **Thursday (Dec 15) through Friday (Dec 16)**

7. Conduct test primary election
  - a. Diagnostic setup (with Use Procedures)
    - i. BOSS
    - ii. Ballot Now
    - iii. eScan
    - iv. PVS (JBC/eScan)
  - b. Logic & Accuracy test of system
    - i. Ballot Now
    - ii. EScan
    - iii. PVS (JBC/eScan)
  - c. "Open Polls" according to Use Procedures
    - i. Generate zero reports for Ballot Now, eScan & JBC
  - d. Cast Votes
    - i. Ballot Now (portion of test deck + manually marked ballots)
      1. Resolve ballots
    - ii. EScan (remainder of test deck)
    - iii. PVS (JBC/eSlate)
      1. Pattern voting, 3 ballots per ballot style (precinct/party combination)
      2. Audio voting
  - e. "Close Polls" according to Use Procedures
    - i. Generate results reports from Ballot Now, eScan & JBC
  - f. Consolidate and Report
    - i. Import from Ballot Now
    - ii. Rally to Tally (eScan and JBC)
    - iii. Canvass reconciliation

1. Provisional Ballots
2. Write-Ins
- iv. Generate final reports
  1. SOVC
  2. Summary
  3. Precincts
  4. Use reports
  5. Audit reports
- g. Servo – recovery and clear

### **Wednesday (Feb 1)**

8. Re-establish baseline
  - a. Verify original install from December testing
  - b. Install updated build
  - c. Document equipment platform
9. Review updated change logs & modify test plan accordingly
10. Verify test deck to SOS specifications
11. Prepare for test general election

### **Thursday (Feb 2)**

12. Conduct test general election
  - a. Logic & Accuracy test using verified test deck
    - i. Ballot Now
    - ii. eScan
  - b. Modify test deck
    - i. Fold ballots
    - ii. Print ballots without ballot ID numbers and without barcodes that include an embedded ballot ID number.
    - iii. Mark additional ballots (no more than 20 per ballot style)
  - c. Open polls according to procedures (incl zero reports)
    - i. Ballot Now (configure to start scanning ballots)
    - ii. eScan
    - iii. JBC
  - d. Cast Votes
    - i. Absentee (Ballot Now)
    - ii. Precinct optical scan (eScan)
    - iii. eSlate
      1. pattern vote
      2. test language capabilities for 3 specified languages: English, Spanish and Chinese
      3. test audio mode
        - a. verify logic

4. test and verify alternative accessibility functionality test provisional ballots
- e. Close polls according to procedures
  - i. Generate poll reports
    5. eScan
    6. JBC
- f. Consolidate
  - i. Rally to Tally using closed IP network and by direct MBB transfer
  - ii. Reconcile write-ins using Ballot Now and Tally
  - iii. Reconcile provisional ballots using Tally
  - iv. Exercise Vote Total Adjustment feature in Tally.
  - v. Print final reports & verify
    7. SOVC (Hart canvass report)
    8. Summary (Hart cumulative report)
    9. Precincts (Hart precinct report)
    10. Use Reports (Hart turnout report, MBB Status report, Polling Place Status, Precinct Election Day Status, Precinct Election Day Status with MBB Ids, and Precinct Turnout)
    11. Audit logs from all system components
    12. Additional reports: Ballot Status, Reassigned Provisional Ballots, Write-Ins Certified/Accepted and Write-Ins Rejected/Unresolved
- g. Recovery – Servo (backup, create recount cards and reset equipment)

### **Friday (Feb 3)**

13. Special Election (Recall) test
  - d. Mark ballots (non-standard markings)
  - e. Open polls (zero tapes)
  - f. Cast votes
    - i. Ballot Now
    - ii. eScan
  - g. Close Polls
    - i. Generate poll reports using eScan
  - h. Consolidate & print reports
    - i. Verify totals between Hart equipment and manual count of Test Recall Election ballots
    - ii. Verify consistency of ballot reads across platforms by comparing vote totals between Ballot Now and eScan
14. Final data capture – all test election data backed up on CD
15. Debrief with vendor

## Appendix B- Incident Summary for Volume Test of Hart eScan & eSlate

### eScan Volume Test

<i>Incident#</i>	<i>Time</i>	<i>Machine #</i>	<i>Ballot #</i>	<i>Incident Report</i>	<i>Photos</i>	<i>Video</i>	<i>Error</i>	<i>Critical (Vote Record Lost)</i>	<i>Machine Error</i>	<i>Human Error</i>	<i>Reboot: Alert Code 0x: 32768</i>	<i>Ballot refused - Error 210</i>	<i>Ballot refused - open scanner to clear</i>	<i>Ballot jam: open ballot box to clear</i>	<i>Ballot jam: clear without opening ballot box</i>	<i>Ballot feed issues</i>	<i>Test deck mistake</i>	<i>Ballot Jam - voter error</i>
1	8:56	4	0	X			"Ballot failed to scan" (fed two ballots at once)			1								1
2	8:58	5	10	X	X		Ballot failed to scan - error code 210		1			1						
3	8:59	32	1	X	X	X	Ballot refused (open/close scanner cover to clear)		1				1					
4	9:02	40	?	X	X	X	Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
5	10:03	38	38	X	X		Alert Code 0x: 32768 (file CmsVoteBad.cpp line 157) - Reboot		1		1							
6	9:11	32	12	X	X		Won't accept ballot - open ballot box to clear jam		1					1				
7	9:07	39	?	X	X	X	Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
8	9:06	22	13	X		X	Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
9	9:04	23	37	X			Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
10	9:11	22	16	X	X	X	Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
11	10:13	7	49	X	X		Won't accept ballot - open ballot box to clear jam		1					1				
12	9:15	37	?	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
13	9:17	4	?	X	X		Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
14	9:20	32	25	X			Won't accept ballot - open ballot box to clear jam		1					1				
15	9:23	31	71	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							

<i>Incident#</i>	<i>Time</i>	<i>Machine #</i>	<i>Ballot #</i>	<i>Incident Report</i>	<i>Photos</i>	<i>Video</i>	<i>Error</i>	<i>Critical (Vote Record Lost)</i>	<i>Machine Error</i>	<i>Human Error</i>	<i>Reboot: Alert Code 0x: 32768</i>	<i>Ballot refused - Error 210</i>	<i>Ballot refused - open scanner to clear</i>	<i>Ballot jam: open ballot box to clear</i>	<i>Ballot jam: clear without opening ballot box</i>	<i>Ballot feed issues</i>	<i>Test deck mistake</i>	<i>Ballot Jam - voter error</i>
16	9:21	23		X		X	Ballot jam - cleared jam at scanner w/out opening Bbox. Reinserted, but error 210 (ballot already read)		1						1			
17	?	29	190	X	X		Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
18	9:20	32	43	X	X		Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
19	9:28	22	65	X			Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
20	9:30	23	123	X			Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
21	9:35	22	67	X			Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
22	10:35	20	158	X	X		Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
23	9:26	31	71	X	X	X	Won't accept ballot - repeated attempts to resubmit, error codes ESN-210, ESN 203, ESN-200		1			1						
24	9:37	23	126	X			Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
25	9:40	40	?	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
26	9:48	22	96	X			Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
27	9:52	4	?	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
28	9:45	35	329	X	X	X	Alert Code 0x: 32768 (file CmsVoterBad.cpp line 177) - Reboot		1		1							
29	9:51	1	387	X	X		Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
30	9:49	17	310	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
31	9:51	31	88	X			Won't accept ballot - open ballot box to clear jam		1					1				
32	9:54	26	?	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
33	9:55	48	?	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
34	9:58	25	?	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							

<i>Incident#</i>	<i>Time</i>	<i>Machine #</i>	<i>Ballot #</i>	<i>Incident Report</i>	<i>Photos</i>	<i>Video</i>	<i>Error</i>	<i>Critical (Vote Record Lost)</i>	<i>Machine Error</i>	<i>Human Error</i>	<i>Reboot: Alert Code 0x: 32768</i>	<i>Ballot refused - Error 210</i>	<i>Ballot refused - open scanner to clear</i>	<i>Ballot jam: open ballot box to clear</i>	<i>Ballot jam: clear without opening ballot box</i>	<i>Ballot feed issues</i>	<i>Test deck mistake</i>	<i>Ballot Jam - voter error</i>
35	9:52	34	189	X	X		Won't accept ballot - open ballot box to clear jam		1					1				
36	??	20	234	X	X	X	Won't accept ballot - cleared jam at scanner w/out opening Bbox		1						1			
37	10:04	17	353	X			Won't accept ballot - Error #210		1			1						
38	10:08	50	212	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
39	10:11	21	?	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
40	10:48	31	?	X			Alert Code 0x: 32768 (file CmsVoterBad.cpp line 177) - Reboot		1		1							
41	?	N/A	?	X			Ballot taken from deck #45 and fed through #49 by mistake			1							1	
42	11:22	46	260	X	X		Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
43	11:28	24	308	X	X		Alert Code 0x: 32768 (file CmsVoterScan.cpp line 322) - Reboot		1		1							
44							<b>NOT USED</b>											
45	10:22	31	320	X	X		Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
46	11:16	10	249	X	X	X	Alert Code 0x: 32768 (file CmsVoteBad.cpp line 157) - Reboot		1		1							
47	11:23	32	245	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
48	8:25	28	365	X			Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
49	8:30	30	355	X			Ballot Jam: Error ESN:200. Pulled and resubmitted successfully		1						1			
50	8:25	44	338	X			Ballot Jam: Error ESN:200. Pulled and resubmitted successfully		1						1			
51	8:35	30	356	X	X		Ballot returned to voter: ESN-200. Pulled & resubmitted.		1							1		
52	8:35	30	357	X	X		Ballot returned to voter: ESN-200. Pulled & resubmitted.		1							1		
53	8:35	30	358 - 362	X			Ballot returned to voter: ESN-200. Pulled & resubmitted.		3							3		

Incident#	Time	Machine #	Ballot #	Incident Report	Photos	Video	Error	Critical (Vote Record Lost)	Machine Error	Human Error	Reboot: Alert Code 0x: 32768	Ballot refused - Error 210	Ballot refused - open scanner to clear	Ballot jam: open ballot box to clear	Ballot jam: clear without opening ballot box	Ballot feed issues	Test deck mistake	Ballot Jam - voter error
54	8:19	10	321	X	X	X	Alert Code 0x: 32768 (file ScannerTask.cpp line 113) - Reboot		1		1							
55	8:24	22	324	X		X	Ballot rejected repeatedly: ESN 201, then 200, then 201		1							1		
56	8:36	36	401	X			Ballot rejected: error code ESN 210		1			1						
57							<b>NOT USED</b>											
58							<b>NOT USED</b>											
59	8:35	44	345	X			Ballot returned to voter: ESN-200. Pulled & resubmitted.		1							1		
60	8:45	44	362, 365	X			Ballot returned to voter: ESN-200. Pulled & resubmitted.		1							1		
61	8:50	30	381	X			Ballot returned to voter: ESN-200. Pulled & resubmitted.		1							1		
62	8:52	30	389	X			Ballot returned to voter: ESN-200. Pulled & resubmitted.		1							1		
63	8:54	30	392	X			Ballot returned to voter: ESN-200. Pulled & resubmitted.		1							1		
64	8:55	30	396	X			Ballot returned to voter: ESN-200. Pulled & resubmitted.		1							1		
							<b>TOTALS</b>	<b>0</b>	<b>59</b>	<b>2</b>	<b>26</b>	<b>4</b>	<b>1</b>	<b>5</b>	<b>13</b>	<b>10</b>	<b>1</b>	<b>1</b>

Machines with Errors: Count = 29 (1, 4, 5, 7, 10, 17, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 32, 34, 35, 36, 37, 38, 39, 40, 44, 46, 48, 50)

Alert Code 0x: 32768

- On twenty-six occasions (21 machines), the eScan locked up and refused to accept ballots. In these instances the screen displayed the error message: Alert Code 0x: 32768. In three instances the error referred to the file CmsVoterBad.cpp, line 177. In one instance, the error message referred to the file CmsVoterScan.cpp, line 322. In the remaining twenty-two instances, the error message referred to file ScannerTask.cpp, line 113. In all twenty-six instances of this error, the eScan needed to be shutdown and restarted, after which voting resumed normally.

### Ballot refused, Error code 210

- On four occasions, the eScan rejected a ballot with error code #210. The vendor explained this error message meant the ballot had already been scanned. It should be noted that the vendor was given permission to print ballot id numbers on the test deck ballots to insure accuracy. This is not normally allowed in California. In each instance, the voter was carefully questioned and insistant that they had not removed a ballot from the ballot box and rescanned it. The vendor did acknowledge that there was a possibility that duplicate serial numbers might have been an artifact from the way the ballots were printed.

### Ballot refused, opened scanner cover to clear

- In one instance (incident # 3), the eScan refused to accept a ballot. After opening and closing the scanner cover, the ballot was resubmitted and accepted normally.

### Ballot jam: open ballot box to clear

- On at least five occasions the eScan stopped accepting ballot with no error message. On these occasions a ballot had jammed in the outtake, past the scanner heads. This jam could only be cleared by opening the ballot box and tugging the ballot free. The State's consultants note they believe that some of the incidents in the next category actually fell into this category, but since they believed that opening the ballot box was the standard procedure for clearing these jams, they did not note this step on the error report.

### Ballot jam: clear without opening ballot box

- On thirteen incidents, the error report indicated that a jam had occurred an been cleared. As noted above, it is believed that some of these also required opening the ballot box to clear, but this was not noted on the error report. In the remaining incidents, the jam was cleared by opening the scanner cover and pulling the ballot out to clear the jam. I should be noted that in one instance, the ballot than refused to scan with the error code 210 ("ballot already read"). This presents a dilemma because a) the message is not clear to the voter that the ballot had been read and 2) there is no means to insert the ballot back into the ballot box without unlocking and opening the ballot box.

### Ballot scan/feed issues

- On nine occasions the eScan refused the ballot and returned it to the voter. In all but one of these instances, the error code "ESN-200" was displayed. Per the vendor, this code stands for "bad box" (a vote position on the ballot that hadn't registered correctly). In these instances the ballot was successfully resubmitted and accepted. In the final instance, the ballot was rejected three times before being accepted, successively showing the error code ESN-201, then ESN-200, then ESN-201. Per the vendor, ESN-201 represents "bad form".

### Human errors

- During the testing, a ballot was mistakenly taken from the test deck for machine #45 and fed into machine #49.
- In one instance (incident # 1), the eScan refuse to scan because the voter had inadvertently scanned two ballots at once.

eSlate Volume Test

Incident#	Time	Machine #	Ballot #	Incident Report	Photos	Video	Error	Critical (Vote Record Lost)	Machine Error	Human Error	Unit taken out of service	Systemstuck in cycle	Printer error: EVBO-101	Printer error: EVBO-102	Printer error: EVBO-103	VAC timed out	VAC set to wrong ballot style	Voter confusion
1	1:22	43	3	X	X		Printer Unavailable - EVBO-102 (false out of paper)		1					1				
2	1:54	13	0	X			Voter attempted to use VAC on wrong row			1								1
3	2:04	1	1	X		X	Voter confused with voting on eSlate			1								1
4	1:35	15	?	X			Activation code programmed for wrong ballot style			1							1	
5	3:00	1	?	X			Activation code programmed for wrong ballot style			1							1	
6	2:38	93	9	X			Activation code programmed for wrong ballot style			1							1	
7	1:40	89		X	X		Activation code programmed for wrong ballot style			1							1	
8		7	0	X	X		Printer Unavailable - EVBO-101 (low battery)		1				1					
9	2:00	10	10	X		X	VAC rejected (timeout)			1						1		
10		10	11	X			Voter left races unvoted, couldn't figure out how to go back			1								1
11	2:45	23	11	X		X	Printer error - EVBO-103 (commun error)		1						1			
12		14	2	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1				
13		75	0	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1				
14		8	4	X		X	Printer Unavailable - EVBO-102 (false out of paper)		1					1				
15	6:10	55	1	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1				
16	9:27	44	1	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1				
17	9:30	48	0	X	X	X	System Alert- Code 0x8000 File pvnt_msg.cpp		1			1						
18	9:01	53	9	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1				
19							----- NOT USED -----											
20							----- NOT USED -----											
21	11:50	48	0	X	X	X	System stuck in cycle (taken out of service)		1		1	1						
22		70	4	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1				

Incident#	Time	Machine #	Ballot #	Incident Report	Photos	Video	Error	Critical (Vote Record Lost)	Machine Error	Human Error	Unit taken out of service	Systemstuck in cycle	Printer error: EVBO-101	Printer error: EVBO-102	Printer error: EVBO-103	VAC timed out	VAC set to wrong ballot style	Voter confusion	
23	9:38	80	2	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1					
24	9:50	66	3	X			Screen freeze - improperly rejected ballot		1			1							
25	9:50	8	4	X		X	Printer Unavailable - EVBO-102 (false out of paper)		1					1					
26	10:05	80	8	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1					
27	10:20	72	0	X			Screen freeze - improperly rejected ballot		1		1	1							
28	11:24	53	102	X	X		Printer Unavailable - EVBO-102 (false out of paper)		1					1					
29	10:01	66		X			Screen freeze - improperly rejected ballot		1		1	1							
30	10:14	62	2	X			Printer Unavailable - EVBO-102 (false out of paper)		1					1					
31	10:15	28	22	X			Activation code programmed for wrong ballot style			1								1	
32	10:45	53	99	X			Printer Unavailable - EVBO-102 (valid out of paper)		1					1					
33	11:00	80	5	X		X	Screen freeze - improperly rejected ballot (replaced power supply)		1		1	1							
34	11:01	82	0	X			Printer Unavailable - EVBO-102 (valid out of paper)		1					1					
35	1:11	66	5	X			Replace pwr supply, retry unit - same symptom		1			1							
36							----- NOT USED -----												
37							----- NOT USED -----												
38	11:26	11	0	X			Voter reports she accepted ballot, but machine rejected. Resaved OK			1									1
							<b>TOTALS</b>	<b>0</b>	<b>24</b>	<b>10</b>	<b>4</b>	<b>7</b>	<b>1</b>	<b>15</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>4</b>

Machines with Errors: Count = 14 (8, 14, 23, 43, 44, 48, 53, 55, 66, 70, 72, 75, 80 & 82)

### System stuck in error cycle

- Four eSlate units got stuck in some kind of an error cycle (incidents 17, 21, 24, 27, 29, 33 & 35). Generally this occurred when trying to cast the ballot. At the time of save, the VBO would print "ballot cancelled" repeatedly on the audit record and the screen controls would freeze. After rebooting the machine, the same symptoms reappeared on the next attempt to cast a ballot. The vendor hypothesized that it was caused by a defective power adaptor or connector for the power adaptor. After swapping out the adaptors, two machines were retested and exhibited the same results. All four machines were taken out of service and not tested further.

### VBO Printer Error: EVBO-101

- One eSlate locked with the printer error "EVBO-101". (Incident #8) Per the vendor, this error code represents a printer battery error. This VBO was opened and the batteries disconnected. Afterwards, voting resumed normally on the eSlate.

### VBO Printer Error: EVBO-102

- On fifteen occasions the eSlate locked up with the screen displaying cryptic error message: "Printer error EVBO-102". Per the vendor, this error code represents an out of paper condition in the VBO. In two cases (incidents #32 & 34) this was correct - the VBO was out of paper. In the thirteen remaining instances this was a false out of paper error. In each case the vendor was able to correct this by removing and disassembling the VBO, and then advancing the paper. Afterwards, voting resumed normally on the eSlate without further errors. In all such cases, the error was triggered within the first ten ballots.

### VBO Printer Error: EVBO-103

- One eSlate locked with the printer error "EVBO-103." Per the vendor, this error code represents a printer communication error. This VBO was swapped out and taken out of service.

### Human Errors

- In one case (incident #9) the assigned activation code timed out before the voter could use it.
- In five cases (incidents #4, 5, 6, 7 & 31), the activation code was issued for the wrong ballot style. As a result, the ballot was cancelled at the JBC and a new activation code issued.
- Four incidents (#2, 3, 10 & 38) were the result of voter confusion. In one case, the voter had tried using an assigned activation code on an eSlate in a different row, not connected to the JBC that assigned the code. In the three remaining instances, the voter was confused over operation of the eSlate.