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REPORT NO.: 51884-08
WYLE JOB NO.: 51884
CLIENT P.O. NO.: 10006806
CONTRACT: N/A
TOTAL PAGES (INCLUDING COVER): 229

DATE: April 12, 2006

TEST REPORT

HARDWARE QUALIFICATION TESTING OF THE SEQUOIA AVC ADVANTAGE DRE VOTING MACHINE (FIRMWARE VERSION 10.1.5)

For
Sequoia Voting Systems
7677 Oakport St. Suite 800
Oakland, CA 94621

STATE OF ALABAMA
COUNTY OF MADISON }

James E. Feller, 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 knowlAdvantage true and correct in all respects.

4/19/06

SUBSCRIBED and sworn to before me this 19th day of April 2006

Patricia Phillips
Notary Public in and for the State of Alabama at Large
My Commission expires Jan. 7, 2009

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.

TEST BY: Wendy Owens 4/19/06
Wendy Owens, Project Engineer Date

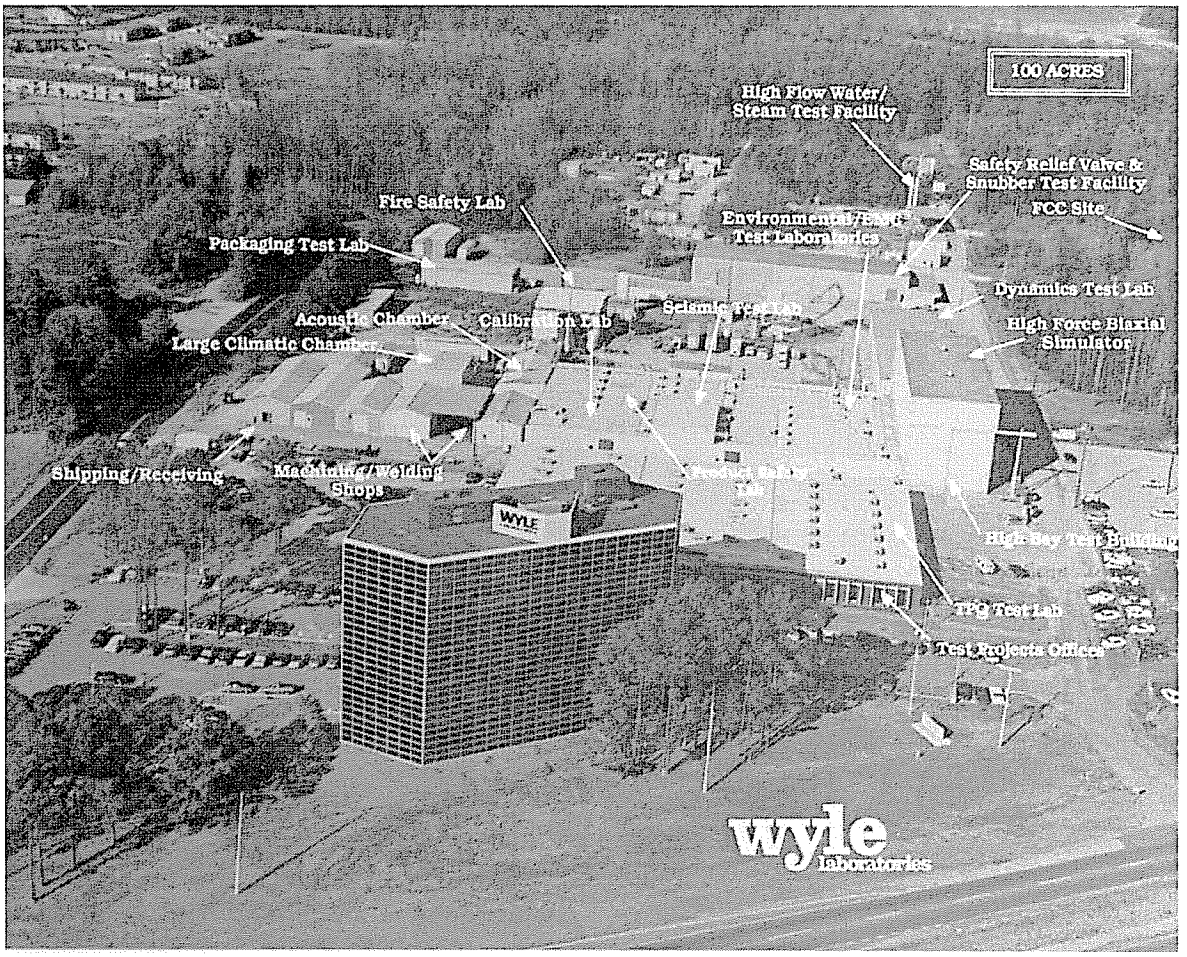
APPROVED BY: for H. F. Foster 19 APR 06
Holly Foster, Engineering Aide Date

WYLE Q.A.: for Brenda Mann 4/19/06
Raul F. Terceno, Q. A. Manager Date

(sh)

ACCREDITED
Cert. # 845.01

ISO 9001:2000



AERIAL VIEW OF WYLE/HUNTSVILLE

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1.0 INTRODUCTION

1.1 Scope

This report presents the test results for Hardware Qualification Testing of the Sequoia Advantage DRE Voting Machine.

1.2 Objective

The objective of this test program was to ensure that the Sequoia Advantage DRE Voting Machine, Firmware Version 10.1.5, complied with the hardware requirements of the Voting Systems Standards, April 2002.

1.3 Summary

Qualification testing includes: the selective in-depth examination of machine resident firmware; the inspection and evaluation of hardware documentation; tests of hardware 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 testing was limited to the Sequoia Advantage DRE Voting Machine and resident machine firmware.

The Advantage and associated Machine Firmware Version 10.1.5, was subjected to Reliability and Functional Tests as summarized in Table I, below.

Table I: Test Requirements

2002 VSS VOL.II SECTION	TEST DESCRIPTION	TEST LAB	RESULTS
3.3.1	Functional Qualification Tests	Wyle	Pass
4.6.6	Humidity Test	Wyle	Pass (1)
4.6.4	Low Temperature Test	Wyle	Pass (1)
4.6.5	High Temperature Test	Wyle	Pass (1)
4.6.3	Vibration Test	Wyle	Pass (1)
4.6.2	Bench Handling Test	Wyle	Pass (1)
4.7.1	Temperature/Power Variation Test	Wyle	Pass (1)
3.4.8 (Vol. I)	Product Safety Review, UL60950-1	Wyle	Pass
4.8.1	Electrical Power Disturbance Test	Wyle	Pass
4.8.2	Electromagnetic Radiation Test	Wyle	Pass
4.8.3	Electrostatic Disruption Test	Wyle	Pass
4.8.4	Electromagnetic Susceptibility Test	Wyle	Pass
4.8.5	Electrical Fast Transient Test	Wyle	Pass
4.8.6	Lightning Surge Test	Wyle	Pass
4.8.7	Conducted RF Immunity Test	Wyle	Pass
4.8.8	Magnetic Fields Immunity Test	Sunrise	Pass (2)

1.0 INTRODUCTION (Continued)

1.3 Summary (Continued)

Notes: 1) Note that the Advantage had previously been qualified to the environmental test requirements as required by the 1990 Voting Systems Standards. The environmental tests required by the 2002 Voting Systems Standards are equivalent or less severe than the 1990 test requirements. Therefore, where applicable, the previous environmental qualification test data has been applied toward the 2002 environmental test requirements. Reference Wyle Report No. 44581-01 for the results of the environmental tests.

2) At the request of Sequoia Voting Systems, FCC Class B Report No. R-4576 from Sunrise Laboratories was included to document EMR test results. Wyle Laboratories provided the inclusion of the report as a courtesy and claims no responsibility for the results contained therein.

It was demonstrated that the Advantage and associated Machine Firmware successfully met the hardware qualification test requirements of the Voting Systems Standards, April 2002. Qualification testing (in-depth source code review and functional tests) was limited to the firmware and hardware used at the precinct level and did not include any election management software, which typically resides on a personal computer and is used for ballot definition, absentee, and report canvassing activities. Testing of the election management software including end-to-end system level testing will be performed by a Software ITA, which will issue the results of such testing under a separate report.

Any anomalies encountered during the hardware qualification testing were successfully resolved prior to test completion.

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

2.0 REFERENCES

- Sequoia Voting Systems Purchase Order No. 10006806
- Sequoia Voting Systems AVC Advantage 10, System Overview, Document Version 1.02, Part Number 096050082, January 2006
- Sequoia Voting Systems AVC Advantage 10, Penetration Analysis, Document Version 1.01, Part Number 096051802, January 2006
- Sequoia Voting Systems AVC Advantage 10, Data Dictionary, Document Version 1.02, Part Number 096050032, January 2006
- Sequoia Voting Systems AQVC Advantage 10, Security Overview, Document Version 1.01, Part Number 096050072, January 2006
- Sequoia Voting Systems AVC Advantage 10, Validation Test Plan, Document Version 1.02, Part Number 096050092, January 2006
- Sequoia Voting Systems AVC Advantage Audio Accessory, Poll Worker/Operator's Manual, Firmware Version 10, Part Number 096116603, January 2006
- Sequoia Voting Systems AVC Advantage 10, Functional Spec, Document Version 1.02, Part Number 096050042, January 2006
- Sequoia Voting Systems AVC Advantage 10, Operators Manual, Document Version 1.02, Part Number 096050062, January 2006
- Sequoia Voting Systems AVC Advantage 10, Maintenance Manual, Document Version 1.02, Part Number 096050052, January 2006
- Sequoia Voting Systems Optech AVC Advantage 10, Configuration Management Plan, Document Version 1.01, January 2006
- Sequoia Voting Systems AVC Advantage 10, Change Specification, Document Version 1.02, Part Number 096050022, January 2006
- Sequoia Voting Systems AVC Advantage 10, Quality Assurance Program, Document Version 1.01, Part Number 096051402, January 2006
- Sequoia Voting Systems AVC Advantage 10, Pollworker Guide, Document Version 1.01, Part Number 096050112, January 2006
- Sequoia Voting Systems AVC Advantage 10, Software Technical Specification, Document Version 1.01, Part Number 096050012, January 2006
- Sequoia Voting Systems AVC Advantage 10, Technical Data Package, Document Version 1.01, Part Number 096050122, January 2006
- Sequoia Voting Systems AVC Advantage 10, Personnel & Training, Document Version 1.01, Part Number 096050002, January 2006
- FEC April 2002 Voting System Standards, Volume I, "Performance Standards', and Volume II, 'Test Standards"
- Wyle Laboratories Report No. 44581-01, "Certification Testing on Sequoia Pacific AVC Advantage Electronic Voting Machines Models D and NYC", dated May 31, 1995.
- Wyle Laboratories' Quality Assurance Program Manual, Revision 2
- MIL-STD-45662A, "Calibration System Requirements"
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"

3.0 CUSTOMER

Sequoia Voting Systems
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4.0 TEST HARDWARE/FIRMWARE DESCRIPTION

The following paragraphs address, in greater detail, the design methodology and product description of the AVC Advantage DRE Voting Machine, of which the Sequoia Voting Systems' Technical Data Package was the source for much of this information.

4.1 AVC Advantage

The AVC Advantage is a Direct-Record Electronic voting machine. It performs the following functions:

- Validate and load ballot definitions.
- Perform pre-election testing and verifications.
- Perform election day voting.
- Perform post-election testing and verifications.
- Print Zero Proof and Results Reports.
- Perform maintenance diagnostic tests and functions such as Audit Trail Transfer, Set Time/Date, and print the Event Log report.

The AVC Advantage provides a full-face ballot presentation for the voter, with up to 504 voting positions. The voting positions are represented by an array of pushbutton switches and LEDs. A printed overlay is used to indicate each contest and candidate, and to provide instructions as desired by the jurisdiction. A Mylar sheet is secured on top of the printed overlay to protect it.

Privacy panels, a privacy curtain and an integral booth light are standard. Internal battery backup provides up to 16 hours of operating time.

The AVC Advantage is tended by a pollworker. A separate Operator Panel is provided for the pollworker, and permits rapid activation for voting and monitoring of machine status (including error conditions).

The AVC Advantage hardware consists of the following major components:

- **Main CPU:** This is an embedded AMD Elan SC400 based system, running ROM-DOS. It contains 8 Mb of DRAM, 2 Mb of Flash ROM (used for application program storage, ballot definition, and vote data storage), a PCMCIA slot (used for the results cartridge), a battery backed real time clock, and a serial port for communication with the I/O Board.

4.0 TEST HARDWARE/SOFTWARE DESCRIPTION (Continued)

4.1 Hardware (Continued)

- **I/O Board CPU:** This is the original Z80 CPU. With firmware version 10, it manages I/O devices and communicates via a dedicated serial port with the Main CPU. It contains program ROM, system ROM, configuration ROM, time and date clock, backup batteries, timers and counters, speaker (beeper), and additional circuits for self-monitoring, connecting the other assemblies, and controlling AVC power consumption.

- **Voter Panel:** The Voter Panel contains all the selection and display devices for the voter. This includes an array of switch modules to select candidates and answer questions, write-in modules to enter write-in selections, cast vote switches to finalize all the voter's selections, and a booth light to light up the front of the ballot.

- **Write-in Keyboard:** The write-in keyboard and display is located below the Voter Panel. The keyboard is used for entering write-in names; the display provides prompts and confirmations to the voter. The write-in keys consist of the letters A-Z, enter (\n), comma (,), hyphen (-), period (.) and apostrophe ('), plus 4 arrow keys: up, down, left, right.

- **Operator Panel:** The Operator Panel contains all the selection and display devices for the maintenance technician or poll worker including switches and LEDS to select and display 12 options, activate or test. An LCD message display. Indicators for ac on and low battery. Automatic power on/off when the panel is inserted/removed.

- **Report Printer:** An integral thermal printer is used for printing reports.

- **Power Supply:** The power supply includes a 32 amp-hour backup battery that can power the AVC Advantage for up to 16 hours.

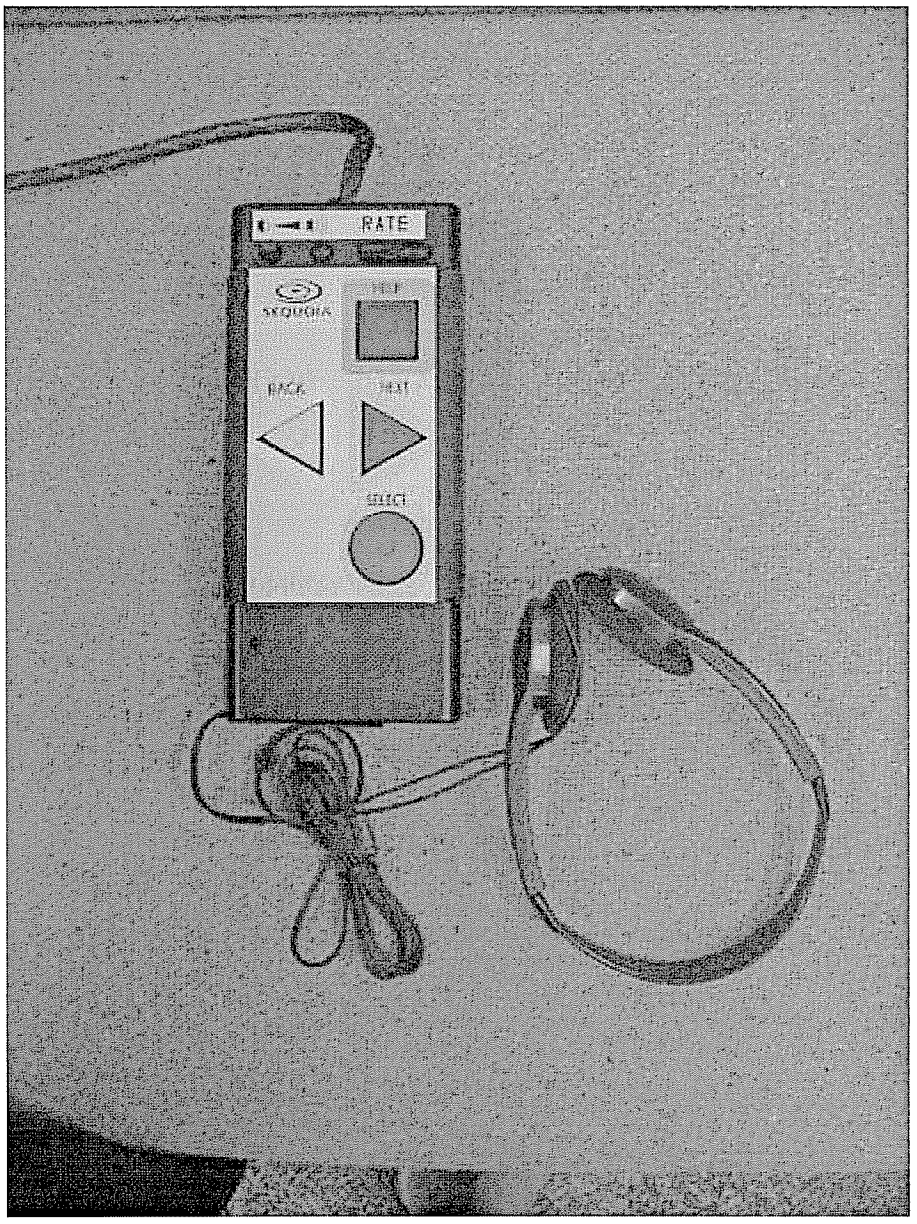
The AVC Advantage includes an optional audio voting interface that is enabled by the pollworker. . This interface uses Sequoia's standard Rev C Audio Box (also used on the AVC Edge touchscreen machine). The voter navigates through the ballot using Next, Back and Select buttons. Help instructions are available at any time. The audio box allows the voter to control the volume and playback speed.

All voting functionality that is available to sighted voters is included for audio voting. Ballots cast with the audio interface are not distinguished in any way from those cast using visual voting.

The AVC Advantage weighs approximately 265 lbs. When opened into the voting position, the AVC Advantage overall dimensions are: Height: 78", Width: 49", and Depth: 46". The AVC Advantage is designed to operate with a standard 120 VAC, 60 Hz power source.

Photograph 1

AVC Advantage DRE



Photograph 2

Audio Box (Revision C)

4.0 TEST HARDWARE/SOFTWARE DESCRIPTION (Continued)

4.2 Firmware

4.2.1 Advantage Firmware

The Advantage firmware is partitioned so that the application code resides on the audio subsystem CPU (Application CPU) and the Z80 CPU board (I/O Processor) serves the role of front-end I/O processor. Communications between the I/O Processor and Application CPU is through the serial port. It

In depth discussion of the software design concepts are documented in the Sequoia Voting Systems AVC Advantage 10, Software Technical Specification, Document Version 1.01, Part Number 096050012, January 2006.

5.0 MATERIALS REQUIRED FOR TESTING

5.1 Equipment

Sequoia provided a sufficient number of Advantage machines to ensure that parallel testing where feasible could be performed. Each Advantage was configured for Audio Ballot processing. The following serial numbers were taken from the Advantage machines used for testing: 22052, 23713, 22047, 25860, 25861, and 11642.

5.2 Test Materials

Sequoia provided all ancillary support material required during the course of the ITA Hardware Qualification Testing.

5.3 Deliverable Materials

Sequoia provided the latest versions of all hardware and software specifications and poll-worker hardware and software user/maintenance manuals. All user manuals have an identifiable Version Number or Document Control Number or Release Date. Reference Paragraph 2.0 for a listing and version of the applicable documentation.

6.0 TEST SPECIFICATIONS

6.1 Functional Qualification Test Matrix

The Advantage was subjected to a series of tests to simulate Election Day activities at the precinct level. These tests were performed to ensure compatibility of voting machine functions at the precinct level using the revised firmware.

6.0 TEST SPECIFICATIONS (continued)

6.1 Functional Qualification Test Matrix (continued)

These included activities to simulate:

a) verification of hardware status via diagnostic reports prior to election
b) performing procedures required to prepare hardware for election operations
c) obtaining 'zero' machine report printouts on all contest fields
d) performing procedures to open the polling place and enable ballot counting
e) casting of ballots to demonstrate proper processing, error handling, and generation of audit data
f) performing hardware operations required to disable ballot counting and closing the polls
g) obtaining machine reports and verifying correctness
h) obtaining machine generated audit logs and verifying correctness

Additionally, logic and accuracy tests were performed and functionality of the following Ballot Logic types were verified:

- General Election
- Closed Primary Election
- Open Primary Election
- Partisan/Non-Partisan
- Straight Party
- Cross Party Endorsement
- Ballot Rotation (limited to rotation between machines)
- Recall Issues w/Options
- Split Precincts
- Vote N-of-M
- Write-In Voting
- Overvotes (disallowed) and Undervotes
- Blank Ballots
- Provisional Ballots

Attachment A contains an overall functional qualification matrix addressing those precinct level hardware characteristics reviewed during hardware qualification testing.

6.2 System Level Volume/Accuracy Tests

The Advantage was subjected to volume/accuracy tests. During the volume and accuracy testing, the Advantageg was subjected to the casting of a large number of ballots to verify vote recording accuracy, i.e., at least 1.54 million ballot positions correctly read and recorded. Testing was performed using an automated Logic & Accuracy test routine. The test utility was implemented with a test script consisting of one contest containing 503 positions. 3600 ballots were then cast resulting in an excess of 1,540,000 positions accurately recorded via the machine totals report.

6.0 TEST SPECIFICATIONS (continued)

6.3 Electrical and Environmental Tests

Hardware qualification testing and a technical data package documentation review were performed to ensure that the AVC Advantage DRE Voting Machine and associated machine resident firmware were in compliance with the Voting Systems Standards 2002 functional requirements.

The Advantage was functionally tested, as it would be configured for use in an election precinct.

The Advantage was subjected to the following hardware environmental and electrical tests:

- Transit Vibration, Mil-Std-810D, Method 514.3, Category 1 – Basic Transportation, Common Carrier[(1)]
- Humidity, Mil-Std-810D, Method 507.2, Procedure I – Natural Hot-Humid[(1)]
- Bench Handling, Mil-Std-810D, Method 516.3, Procedure VI[(1)]
- Low Temperature, Mil-Std-810D, Method 501.2, Procedure I - Storage[(1)]
- High Temperature, Mil-Std-810D, Method 502.2, Procedure I - Storage[(1)]
- Environmental Operating, 163 Hr Reliability[(1)]
- Product Safety, UL60950, Product Safety, Information Technology Equipment
- FCC Part 15 Emissions
- Electrostatic Discharge, IEC EN 61000-4-2
- Electromagnetic Radiation, IEC EN 61000-4-3
- Electrical Fast Transients, IEC EN 61000-4-4
- Lightning Surge, IEC EN 61000-4-5
- Conducted Immunity, IEC EN 61000-4-6
- Magnetic Fields, IEC EN 61000-4-8

(1) Note that the Advantage had previously been qualified to the environmental test requirements as required by the 1990 Voting Systems Standards. The environmental tests required by the 2002 Voting Systems Standards are equivalent or less severe than the 1990 test requirements. Therefore, where applicable, the previous environmental qualification test data has been applied toward the 2002 environmental test requirements. Reference Wyle Report No. 44581-01 for the results of the environmental tests.

Attachments C through E contain the resultant test data of the above referenced tests, excluding the environmental tests previously performed as part of the 1990 Voting Systems Standards qualification process.. Reference Wyle report 44581-01 for the results of these tests.

6.0 TEST SPECIFICATIONS (Continued)

6.4 Firmware

The precinct-level Advantage machine level firmware was subjected to a source code review. The source code was reviewed to ensure it followed the recommended programming guidelines as contained in the FEC standards. This included a review for:

- **Simplicity**: the straightforwardness of the design, such as avoidance of complex structure and obscure algorithms.
- **Understandability**: the ease with which the intent and function of the code can be ascertained and verified.
- **Testability**: the construction of code so as to incorporate implicit or explicit points or features to the flow of data and control within modules and at module interfaces.
- **Robustness**: a property of software design that is enhanced by editing and range specification, by the incorporation of controls or traps for immediate detection of errors to prevent their propagation throughout the rest of the code, and by providing a means of recovery without loss of control or data.
- **Security**: the inclusion of provisions to prevent unauthorized access, or to detect and control it, should it be attempted.
- **Usability**: the ability of the Voting Machine to be operated without recourse too excessive or obscure control procedures (e.g., text messages rather than numerical error codes that require the user to consult a table).
- **Installability**: the ease with which a Voting Machine can be made fully operational after delivery.
- **Maintainability**: the ease with which defects can be identified, corrected, and validated in the field.
- **Modifiability**: the ease with which new features can be incorporated into existing software.

Attachment B contains the Advantage Source Review Report, Firmware Version 10.1.5.

6.0 TEST SPECIFICATIONS (Continued)

6.5 Operating Test

6.5.1 Operating Environmental Test

The Advantage was subjected to a Temperature and Power Variation Test in accordance with section 4.7.1 of Volume II of the 2002 FEC Voting Systems Standards.

To demonstrate a minimum acceptable Mean-Time-Between-Failure threshold, three Advantages were placed inside an environmental walk-in test chamber and connected to a variable voltage power source. The temperature inside the chamber and the voltage supplied to the hardware varied from 40°F to 100°F and from 105 VAC to 129 VAC. During test, the ballots were counted every hour. The environmental test profile and Chamber Thermal Circular Charts are presented in Attachment C.

The AVC Advantage DRE Voting Machine successfully completed the requirements of the Operating Environmental Test. Reference Wyle report 44581-01 for the results of this test.

6.6 Non-Operating Environmental Tests

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

6.6.1 Low Temperature Test

The Advantage was subjected to a Low Temperature Test in accordance with section 4.6.4 of Volume II of the 2002 FEC Voting Systems Standards.

The Advantage was subjected to a baseline operability checkout to verify system readiness. Upon completion, the Advantage was placed in an environmental test chamber. The chamber temperature was lowered to -15°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 Advabtage was removed from the chamber and inspected for any obvious signs of degradation and/or damage. None were observed. The Advantage was successfully subjected to a post-test operability checkout.

The AVC Advantage DRE Voting Machine successfully completed the requirements of the Low Temperature Test. Reference Wyle report 44581-01 for the results of this test.

6.0 TEST SPECIFICATIONS (Continued)

6.6 Non-Operating Environmental Tests (Continued)

6.6.2 High Temperature Test

The Advantage was subjected to a High Temperature Test in accordance with section 4.6.5 of Volume II of the 2002 FEC Voting Systems Standards.
The Advantage was subjected to a baseline operability checkout to verify system readiness. Upon completion, the Advantage was placed in an environmental test chamber. The chamber temperature was raised to 150°F and allowed to stabilize. Upon 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 Advantage was removed from the chamber and inspected for any obvious signs of degradation and/or damage. None were observed. The Advantage was successfully subjected to a post-test operability checkout.

The AVC Advantage DRE Voting Machine successfully completed the requirements of the High Temperature Test. Reference Wyle report 44581-01 for the results of this test.

6.6.3 Vibration Test

The Advantage was subjected to Vibration Tests in accordance with section 4.6.3 of Volume II of the 2002 FEC Voting Systems Standards.

The Advantage was subjected to a baseline operability checkout to verify system readiness. Upon completion, the Advantage was secured to an electrodynamics shaker. One control accelerometer was affixed to the shaker table. The Advantage was subjected to the Basic Transportation, Common Carrier profile as depicted in Mil-Std-810D, Method 514.3, Category I. The Advantage was subjected to vibration for 30 minutes in each orthogonal axis. Upon test completion, the Advantage was inspected for any obvious signs of degradation and/or damage. None were observed. The Advantage was successfully subjected to a post-test operability checkout.

The AVC Advantage DRE Voting Machine successfully completed the requirements of the Vibration Test. Reference Wyle report 44581-01 for the results of this test.

6.6.4 Bench Handling Test

The Advantage was subjected to Bench Handling Tests in accordance with section 4.6.2 of Volume II of the 2002 FEC Voting Systems Standards.
Each corner 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 corner, for a total of 24 drops. Upon test completion, the Advantage was inspected for any obvious signs of degradation and/or damage. None were observed. The Advantage was subjected to a post-test operability checkout and continued operability verified.

The AVC Advantage DRE Voting Machine successfully completed the requirements of the Bench Handling Test. Reference Wyle report 44581-01 for the results of this test.

6.0 TEST SPECIFICATIONS (Continued)

6.6 Non-Operating Environmental Tests (Continued)

6.6.5 Humidity Test

The Advantage was subjected to a Humidity Test in accordance with section 4.6.6 of Volume II of the 2002 FEC Voting Systems Standards.

The Advantage was subjected to a baseline operability checkout to verify system readiness. Upon completion, the Advantage was placed in a Thermotron Humidity Chamber. The Advantage was subjected to a 10-day humidity cycle in accordance with the procedures as found in MIL-STD-810D, Method 507.2, Procedure-Natural Hot Humid. Upon test completion, the Advantage was inspected for any obvious signs of degradation and/or damage. None were observed. The Advantage was successfully subjected to a post-test operability checkout.

The AVC Advantage DRE Voting Machine successfully completed the requirements of the Humidity Test. Reference Wyle report 44581-01 for the results of this test.

6.7 Electrical Tests

The Advantage was subjected to various Electromagnetic Compatibility tests to ensure continued system operation and reliability in the presence of abnormal electrical events. The Advantage was powered and actively counting ballots during all electrical tests.

6.7.1 Electrostatic Discharge

Electrostatic Discharge Testing was performed in accordance with the 2002 Voting Systems Standards to ensure that should an electrostatic discharge event occur during equipment setup and/or ballot counting, that the Advantage 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 Advantage was configured to run in an automated ballot count test mode, whereas continual ballot processing would occur during the testing without operator intervention. The Advantage 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 touchscreen, user buttons, and other likely points of contact.

There was no loss of normal operation and or loss of data as a result of the applied discharges.

An Electrostatic Discharge Data Sheet is contained in Attachment C. Attachment F contains the ESD Instrumentation Equipment Sheet.

6.0 TEST SPECIFICATIONS (Continued)

6.7 Electrical Tests (Continued)

6.7.2 Electrical Fast Transients

Electrical Fast Transients (EFT) testing was performed in accordance with the 2002 Voting Systems Standards to ensure that, should an electrical fast transient event occur on a power line, the Advantage would continue to operate without disruption of normal operation of loss of data.

The Advantage was configured to run in an automated ballot count test mode, whereas continual ballot processing would occur during the testing without operator intervention. The Advantage was then subjected to electrostatic fast transients of 2 kV applied to its AC power lines.

There was no loss of normal operation and or loss of data as a result of the applied transients.

An EFT Data Sheet and a test setup photograph are contained in Attachment C. Attachment F contains an Instrumentation Equipment Sheet.

6.7.3 Lightning Surge

Lightning Surge Testing was performed in accordance with the 2002 Voting Systems Standards to ensure that, should a surge event occur on a power line due to a lightning strike, the Advantage will continue to operate without disruption of normal operation or loss of data.

The Advantage was configured to run in an automated ballot count test mode, whereas continual ballot processing would occur during the testing. The Advantage power input lines were then subjected to the following surges:

- +/- 2 kV AC line-to-earth
- +/- 2 kV AC line-to-line

There was no loss of normal operation and or loss of data as a result of the applied surges.

A Lightning Surge Test Data Sheet and test setup photograph is contained in Attachment C. Attachment F contains a Surge Instrumentation Equipment Sheet.

6.0 TEST SPECIFICATIONS (Continued)

6.7 Electrical Tests (Continued)

6.7.4 Electromagnetic Susceptibility

Electromagnetic susceptibility testing was performed in accordance with the 2002 Voting Systems Standards. This testing was performed to ensure that the Advantage would be able to withstand a moderate level of ambient electromagnetic fields without disruption of normal operation or loss of data.

The Advantage was configured to run in an automated ballot count test mode, whereas continual ballot processing would occur during the testing without operator intervention. The Advantage was then subjected to ambient electromagnetic fields up to a maximum of 10 V/m over a range of 80 MHz to 1000 MHz.

There was no loss of normal operation and or loss of data as a result of the applied electromagnetic fields.

An Electromagnetic Susceptibility Data Sheet is contained in Attachment C. Attachment F contains an Electromagnetic Susceptibility Instrumentation Equipment Sheet.

6.7.5 Conducted RF Immunity

Conducted RF Immunity testing was performed in accordance with the 2002 Voting Systems Standards. This testing was performed to ensure that the Advantage will be able to withstand conducted RF energy onto its power lines without disruption of normal operation or loss of data.

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

There was no loss of normal operation and or loss of data as a result of the applied conducted RF energy.

A Conducted RF Susceptibility Data Sheet and test setup photograph is contained in Attachment C. Attachment F contains a Conducted RF Susceptibility Instrumentation Equipment Sheet.

6.0 TEST SPECIFICATIONS (Continued)

6.7 Electrical Tests (Continued)

6.7.6 Magnetic Fields Immunity

Magnetic Fields Immunity testing was performed in accordance with the 2002 Voting Systems Standards. This testing was performed to ensure that the Advantage will be able to withstand AC magnetic fields without disruption of normal operation of loss of data.

The Advantage was configured to run in an automated ballot count test mode, whereas continual ballot processing would occur during the testing. The Advantage 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 and or loss of data as a result of the applied conducted RF energy.

A Magnetic Fields Data Sheet is contained in Attachment C. Attachment F contains a Magnetic Fields Instrumentation Equipment Sheet.

6.7.7 Electrical Power Disturbance

Electrical Power Disturbance testing was performed in accordance with the 2002 Voting Systems Standards. This testing was performed to ensure that the Advantage will be able to withstand electrical power line disturbances (dips/surges) without disruption of normal operation or loss of data.

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

There was no loss of normal operation and or loss of data as a result of the applied electrical disturbances.

An Electrical Power Disturbance Data Sheet is contained in Attachment C. Attachment F contains a Power Disturbance Instrumentation Equipment Sheet.

6.7.8 FCC Part 15 Emissions

Electromagnetic Radiation emissions measurements were performed in accordance with the 2002 Voting Systems Standards. 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 Advantage was configured to run in an automated ballot count test mode, whereas continual ballot processing would occur during the testing.

The Advantage was found to comply with the required emissions limits. The FCC Part 15 Emissions Test Report is contained in Attachment D.

6.8 Product Safety

The Advantage was successfully subjected to a product safety review to ensure its compliance with UL/IEC60950, "Safety of Information Technology Equipment".

Attachment E contains the Product Safety Report.

7.0 TEST EQUIPMENT AND INSTRUMENTATION

All instrumentation, measuring, and test equipment used in the performance of this test program were calibrated in accordance with Wyle Laboratories' Quality Assurance Program, which complies with the requirements of ANSI/NCSL 2540-1, ISO 10012-1, and Military Specification MIL-STD-45662A. 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.

Attachment K contains Instrumentation Equipment Sheets.

8.0 WYLE QUALITY ASSURANCE

All work performed on this program was completed in accordance with Wyle Laboratories' Quality Assurance Program Manual, Revision 2.

Wyle Laboratories is accredited (Certificate No.: 845.01) by the American Association for Laboratory Accreditation (A2LA), and the results shown in this test report have been determined in accordance with Wyle's scope of accreditation unless otherwise stated in the report.

Pages 22 through F-8 of the 4/12/06 Wyle Report No. 51884-08 have been redacted because they contain trade secrets of Sequoia including proprietary source code and related materials.