



**Limited-Scope User Acceptance Test Results of the  
AutoMARK™ Vote Assist Terminal in Wake County**

*For*

**The Wake County, North Carolina, Board of Elections**

*By*

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## Acceptance Test Summary

The North Carolina State Board of Elections (SBOE) took two steps leading to the Wake County Board of Elections' (BOE) selection of new voting systems. First, the SBOE decertified Wake County's voting systems in late 2005. Second, at approximately the same time, the SBOE selected Election Systems and Software (ES&S), which became the only certified vendor of voting systems for the State of North Carolina.

The Wake County BOE and Wake County Commissioners selected the M-100 computerized optical scan voting system for both early voting and in-precinct voting sites. Wake County asked InfoSENTRY Services Inc. to develop and administer a user acceptance test UAT for the M-100. (Please see InfoSENTRY Services, [Acceptance Test Results of the M-100 Computerized Optical Scan Voting System Units in Wake County](#). Raleigh, NC: 20 March 2006 and InfoSENTRY Services, [Acceptance Re-Test Results of the M-100 Computerized Optical Scan Voting System Units in Wake County](#). Raleigh, NC: 08 April 2006.

The Wake County BOE and Wake County Commissioners selected the AutoMARK™ Vote Assist Terminal as the device to provide physical accessible voting systems for both early voting and in-precinct voting sites. The County prepared two of these units for immediate use in early voting sites because of the proximity of Wake County's primary election in May. Wake County asked InfoSENTRY Services to develop and administer a user acceptance test for the remaining AutoMARK™ units.

The test team tested 214 of the devices. They found 17 of the units with some physical or operational characteristic that cause the units to fail the test. The test also documented several operational characteristics that will require future training and awareness steps both for poll workers and voters.

Additionally, the test reaffirmed the existence of a firmware problem that causes the system to become unresponsive and cease normal operations under certain circumstances. This situation requires a reboot of the system in order to resume normal operations. Under other circumstances, it is possible that poll workers will be in a position then to view the marked ballots of an AutoMARK™ user during routine troubleshooting operations.

The test also determined that a security hole in the system allows poll workers or voters, both using non-system administrator accounts, to reach the device's Windows CE operating system under certain circumstances. In this instance, it is possible to take actions to render the system unusable. Wake County and InfoSENTRY have notified verbally both ES&S and the North Carolina State Board of Elections of these issues. The test did not find any instance in which the device failed to mark ballots accurately if users understood and carried out the application's on-screen or audio instructions.

ES&S and AutoMARK technical staff have already taken actions to repair the mechanical malfunctions that caused many of the AutoMARKs to fail the limited scope user acceptance test. InfoSENTRY recommends that Wake County provide its elections office staff and poll workers with additional instructions for operations and awareness of security steps that will mitigate security issues found during this test.

## Introduction

The North Carolina State Board of Elections (SBOE) took two steps leading to the Wake County Board of Elections' (BOE) selection of new voting systems. First, the SBOE decertified Wake County's voting systems in late 2005. Second, at approximately the same time, the SBOE selected Election Systems and Software (ES&S) as the only certified vendor of voting systems for the State of North Carolina. (The SBOE initially certified Diebold as a second vendor and gave conditional certification to a third vendor, Sequoia. However, Diebold withdrew from the procurement process and Sequoia did not meet the deadline for meeting the conditional terms.)

After the SBOE provided Wake County with a list of tested and certified voting systems from which it could choose, the BOE and the Wake County Commissioners selected the AutoMARK™ as the voting system physically disabled voters will use to mark ballots, which the M-100 optical scanners will then read and tabulate. (The SBOE's Request for Proposals [RFP] and ES&S's response to the RFP contain substantial detail about the requirements and capabilities of these devices. The minutes of the Wake County BOE's meetings in January—February 2006 detail the discussions regarding the decision and the order for the AutoMARKs™.)

The SBOE notified Wake County about the process through which the SBOE and ES&S would test Wake County's equipment in Goldsboro. SBOE Memo 2006-3, dated January 26, 2006, stated,

“To facilitate User Acceptance Testing (UAT) and provide quality assurance, State Board staff will assist ES&S as soon as confirmed orders are submitted and machines are received at the central warehouse in Raleigh. The State Board of Elections will use HAVA funds to pay for acceptance testing of the iVotronic, iVotronic ADA, M100 and AutoMark. This procedure will more efficiently use available time, reduce out of the box error rates and result in an approximate cost savings of \$2.4 million to the county boards of elections. County boards of elections will be encouraged to be present for the UAT to monitor or assist as deemed appropriate.”

Subsequently, SBOE Memo 2006-5, dated February 2, 2006, stated,

“We have moved the User Acceptance Testing to a central warehouse and the State Board of Elections will be paying all the costs of testing with additional HAVA funds. This will save the counties approximately \$2.3 million dollars in HAVA funds that can be used for additional voting equipment. When the warehouse is ready for equipment testing each county will be notified when they can send technicians to the warehouse to monitor and participate in the testing process in addition to learning valuable information about the voting machines.”

Acting pursuant to permission from the SBOE, the Wake County BOE sent one staff member and observers from InfoSENTRY to the SBOE/ES&S acceptance testing in Goldsboro. During that activity, InfoSENTRY noted that, under certain circumstances, the AutoMARK™ unit would cease normal operations and appear to become inoperative. An AutoMARK™ technician confirmed that if a user made selections during one session using both an ADA device, such as a sip-and-puff interface or foot pedals, and the

device's keypad, the current version of firmware could render the system inoperative. This condition required a reboot to remedy the temporary problem. (Please see Newkirk memo to Cherie Poucher, [AutoMARK Testing](#). 06 April 2006.)

The opportunity to observe the unpacking, after manufacture testing, and repackaging of the AutoMARKs in Goldsboro was very helpful in developing our plans for the limited scope user acceptance testing described in this report.

## Test Methodology

Wake County BOE worked with InfoSENTRY Services, Inc. to develop and carry out a plan to conduct a limited-scope user acceptance test UAT for the AutoMARK™ units. We refer to this UAT as having "limited-scope" because the test's scope did not include the use of ES&S's software to set up the test election and test ballot. It did not include preparation of the flashcards that are integral to the operation of the voter assist unit. With only limited exceptions, time did not permit running all of the ballots printed by the AutoMARK™ into the M-100 for tabulation.

Before describing our test methodology, is important to state clearly what this test was not. It was not a full business function test to determine the devices "fit for purpose" pursuant to the SBOE's procurement process. That kind of testing was the responsibility of the SBOE.

It was not a security test. It did not involve many of the activities typically associated with security risk assessments, system penetration assessments, and source code reviews. Typically those kinds of tests occur internally by the development team and externally by independent third-party reviewers.

It was not a "human factors design" test. It did not examine the suitability of the device to meet Federal requirements for physical accessibility.

It was not a certification examination. Those examinations in elections settings typically occur pursuant to statutory mandates. They often involve additional research steps even after actual hands-on examinations.

A user acceptance test (UAT), even of limited-scope, reviews the functioning of systems in a setting that is not significantly unlike the operational environment in the Wake County schools and community centers in which the voting system will serve. User acceptance tests look for how the system will likely perform in both usual and unusual, but possible, circumstances in their actual operational environments.

The primary constraints of the test plan centered around the very short amount of time available for testing and the need to test as many of the units as possible in that time period. Even though Wake County will test the devices once again prior to certification for use in the May Primary Election, the BOE Director believed that it was essential to test as many of the units as possible in order verify that the devices delivered to Wake County met basic requirements for use in polling places.

We also used this opportunity to acquaint BOE staff, who served as testers, with basic operations of the AutoMARK voting unit by having them participate in the test. InfoSENTRY provided either a certified information system professional or a certified quality auditor, both with formal experience in examining and testing election systems, on site as a test supervisor at all times during the test.

InfoSENTRY prepared a test scenario containing steps to test the AutoMARK's™ ability to receive inputs from voters through the touchscreen, the device's specially designed keypad, and a device referred to by the manufacture as the ADA<sup>1</sup> input device. The scenarios included steps to enter ballot selections, delete ballot selections, modify ballot selections, review ballot selections, and print ballot selections. The Director of the Wake County Board of Elections reviewed the scenarios and suggested modifications prior to the beginning of the test. After the test team received initial training from a BOE staff member in operation of the AutoMARK™ on the first day of the test period, we made minor wording modifications to the test scenario.

Prior to the test, the BOE provided InfoSENTRY with appropriate system and user manuals it had received from the vendor. The BOE also provided a copy of the poll worker manual it had created for use in polling places.

On the first day of the test, a BOE staff member, who had received vendor training in operation of the AutoMARK™, provided a detailed overview and training for use of the device. The testers uniformly agreed that they had received completely sufficient orientation and training in the system's operation. The Director of the Wake County BOE invited vendor representatives and representatives from the State Board of elections to attend the test sessions as an additional backup in the event we had questions during the test.

Each tester followed a standard procedure while going through the test scenario. They noted any anomaly from expected results or normal operations of the system's hardware and software. If a device exhibited a flaw or anomalous behavior that a tester believed would impair its use in a polling place, the tester called the issue to the attention of another tester and a test administrator. Before marking a device as an acceptable, the tester had to receive concurrence from the test administrator in that action.

After examining the ballots printed by an AutoMARK™, a tester could scan ballots through an M-100 optical scanner to determine if the ballot marking device had printed marks that were accurately readable. (We found no instances of failure to mark the ballots accurately or sufficiently.)

At the conclusion of each machine's test, the tester provided a completed test checklist, along with ballots printed by the device, to the test administrator. InfoSENTRY entered the results of each machine's test into the test database.

We note again that this test and its results do not constitute a definitive statement of "fitness for purpose" of the AutoMARK™ as a computational device or a vote marking device. The Wake County BOE assumes that the State Board, in selecting ES&S and in certifying its systems for use in North Carolina, has determined that the vendor's hardware, software, and services are fit for use in Wake County and comply with all State and Federal statutes and requirements.

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<sup>1</sup> A reference to the Americans with Disabilities Act.

## Test Results

Attachment 1 contains the machine-by-machine listing of the test results. Seventeen (17) of the 214 devices in the UAT failed at some stage of this functional test. The detailed results indicate that other devices experienced inability to recognize ballots when testers inserted them, paper jams, failures at bootup, and inability to recognize the existence of a print cartridge. However, upon retest, these devices performed satisfactorily to pass the test.

**Anomaly 01:** *The failure of seventeen (17) units out of a total of 214 units represents a failure rate of approximately 8% for the total set of AutoMARKs™ involved in Wake County's UAT. This failure rate was somewhat higher than expected. **Impact: Major.** The failure rate and the higher-than-expected number of anomalies and problems noted on other devices point to a substantial amount of training required for poll workers in the future. They also point to a possibly higher-than-expected maintenance and repair effort on the devices in coming years. If these problems and anomalies continue to appear, the total cost of ownership (TOC) of these devices will be higher than anticipated. Nonetheless, barring a very high failure rate of the devices during the election certification activities now underway, Wake County will have a sufficient number of devices for its Primary Election's 189 polling places on 02 May 2006.*

ES&S has already sent AutoMARK™ technicians to repair mechanical malfunctions on many of the 17 devices that not pass the UAT. ES&S has also indicated that, in the event more devices fail the election certification process, they might be able to provide additional machines from the Goldsboro warehouse.

A problem with the AutoMARK's™ firmware came to light during the initial ES&S/SBOE testing in Goldsboro. After seeing one of the devices become non-responsive and apparently cease operation during test operations, a technician informed us that this was a known error in the current version of the firmware. The error occurs intermittently when a voter uses the ADA input device and then uses the keypad during the same voting session. According to the technician, this situation can cause the application to "sometimes get confused" with a result that the system needs to be rebooted. We confirmed this anomaly and error during the UAT.

**Anomaly 02:** *This problem can render the device non-responsive and require a reboot in the middle of a voting session. At the least it will be an inconvenience for the voter and at the worst it can be disruptive and confusing to the voting process. **Impact: Major.** This firmware error can affect every device in Wake County intermittently during use of an ADA input device. ES&S is aware of the situation and indicates they will correct the problem in a subsequent firmware release.*

We stated earlier that this test was not a security risk assessment, system penetration test, or security code review. However, during the UAT our testers came upon two situations that reflect the security profile of the AutoMARK™.

Information security involves the confidentiality, integrity, and availability of a system and the information it processes. Integrity often refers generally to the accuracy and completeness of the information a system processes. The UAT produced no indication that the AutoMARK™ failed to provide accurate and complete ballot markings on all devices. We found no hardware or software malfunctions, under both normal and unusual use conditions, that produced marking errors.

However, we found one situation that has the potential of exposing how users have marked their ballots to election workers and other bystanders. The situation occurred on more than one machine and occurred in the normal use conditions that we expect to find in polling places.

In the course of printing ballots after making all selections, several testers experienced paper jams on their test devices. Following the instructions on the screen, the testers called for an election official (in this case, the test administrator). The administrator opened the AutoMARK™ in an attempt to clear the ballot jam. When successful, this procedure allowed the administrator to view the ballot and any selections printed on it.

Figure 1 contains a photograph of one way in which a poll worker could readily open the AutoMARK™ in an attempt to clear a paper jam.

**Figure 1**



We examined the ES&S/AutoMARK™ Poll Worker's Guide (2005) to determine if there were procedures for clearing a jam of a ballot in the process of printing that would not involve a poll worker having physical and visual access to a partially printed ballot. The following sections contain relevant text regarding the recommended steps for clearing a ballot jam.

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#### **“Clearing a Paper Jam**

Follow the procedure below to clear a paper jam.

1. Open the top panel or the rear clean-out panel.
2. Remove the ballot.
3. If ballot is not damaged and is not folded in any way, re-insert the ballot correctly.”

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"ERROR – PAPER JAM	Paper ballot was inserted correctly, but the AutoMARK VAT tractor feed mechanism cannot move ballot into the next position.	<ol style="list-style-type: none"><li>1. Open the top panel or the rear clean out panel.</li><li>2. Remove the ballot.</li><li>3. If the ballot is not damaged, re-insert the ballot correctly."</li></ol>
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Page 19.

"If you encounter an error that causes a spoiled ballot, eject the ballot to the voter and **do not** look at the voter's selections. Follow your local procedures for a spoiled ballot."

The instruction to the election worker to avoid looking at the voter's selections is a good and appropriate one. However, it comes relatively late in the manual after previous instructions for removing an examining ballots. During the hectic nature of some busy election days, election workers will take whatever steps they can to assist voters in completing the voting process. A simple admonition to avoid looking at voters selections is likely to have relatively little effect at these times.

**Anomaly 03:** *During the course of the acceptance test, Wake acceptance testers had several ballot jams that occurred during times when the ballot was in the printing phase. A review of the test notes in Attachment 1 will show a number of times that the testers experienced ballot jams. These situations offer opportunities for someone other than the voter to view the markings made on the ballot. **Impact: Major.** In the short term for the May Primary, ES&S and Wake County need to bolster instructions to election workers about proper procedures to follow in the event of ballot jams to avoid seeing any voter's selections.*

During the UAT, we also found situations that allowed voters or election workers in particular situations in the normal operating environment to render the AutoMARK™ inoperable and to corrupt the system flashcard in such a manner as to render it in operable. We made the systems incapable of being booted normally. The effect of this action would be to make the single AutoMARK™ at a polling place unavailable for further use on Election Day.

We have provided detailed verbal descriptions of the security hole to both the State Board of elections and ES&S. Attachment 2 contains photographs of the effects of our actions on two machines. We are not providing additional public information about the security weakness in order to prevent the information from being used in any malicious manner.

**Anomaly 04:** *While the security flaw is not likely to manifest itself widely on the AutoMARK™ and does not directly affect the integrity aspect of the systems security, it does constitute a potential problem that requires both immediate and longer-term action. It has potential ramifications for the constant availability of the device in polling places. **Impact: Major.***

*ES&S indicates in a letter in Attachment 3 that the flaw uncovered in our testing is not a real flaw in the system. However, the letter indicates that the firm has been aware of the problem and has software modifications in the pipeline to mitigate the issue. InfoSENTRY is working with the Wake BOE to implement operational steps, security awareness measures, and election information confidence measures for voters in the May 2006 Primary.*

## Attachment 1: Summary Results for Each Device



## Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

### Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input type="checkbox"/>	AM0106420106	AutoMARK	On printing Ballot #2, ballot jammed and created a loud rubbing sound within the device. Opened the cover of the ballot eject chute and saw the ballot in the tray. Observed red light in the bottom paper tray area. Could not retrieve ballot (very tight). Thought I might damage if I pulled too hard.
<input type="checkbox"/>	AM0106430336	AutoMARK	First ballot not recognized. Second attempt failed. Third attempt failed. Six attempts total. Two different ballots. Tried a new flashcard. Failed. Still does not recognize ballots.
<input type="checkbox"/>	AM0106431683	AutoMARK	The tester was thrown to the Windows CE operating system at which time he was able to modify and delete critical system and application files. He was able to create a new Windows folder on the system. The tester reached the MS-DOS command prompt. The tester's actions rendered the AutoMARK™ inoperative, incapable of further use. The tester carried out all of these actions in a non-privileged account while following on-screen instructions. The Wake County and InfoSENTRY test team replicated the security flaw on two additional AutoMARKs™ indicating that it is intermittently present on all of the devices in Wake County.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input type="checkbox"/>	AM0106431842	AutoMARK	Receives data error on boot.
<input type="checkbox"/>	AM0106431920	AutoMARK	The tester was thrown to the Windows CE operating system at which time he was able to modify and delete critical system and application files. He was able to create a new Windows folder on the system. The tester reached the MS-DOS command prompt. The tester's actions rendered the AutoMARK™ inoperative, incapable of further use. The tester carried out all of these actions in a non-privileged account while following on-screen instructions. The Wake County and InfoSENTRY test team replicated the security flaw on two additional AutoMARKs™ indicating that it is intermittently present on all of the devices I Wake County..
<input type="checkbox"/>	AM0106431931	AutoMARK	Ballot hung up on exiting. Had to feed ballot twice. Received error message on insert. Need to check the paper output. Ballot catches and folds end of ballot on left.
<input type="checkbox"/>	AM0106431933	AutoMARK	Trouble with ADA not fitting correctly. Tried another ADA device jack. Terminated the test when we determined the ADA input jack was defective.
<input type="checkbox"/>	AM0106432046	AutoMARK	3rd Ballot--"Ballot not recognized" error. Accepted on 2nd try. Touchscreen took three tries for vote to record. Ballot #4--overvote message--took five times to return to contest. Took five times touching <zoom in/zoom out>. Note: Tester played with the touch screen for a while. It appears to work. But it does take more pressure than other AutoMARKS.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input type="checkbox"/>	AM0106432365	AutoMARK	Ballot #1, "not recognized." Cleared. Ballot jammed. At corners of the ballot. Rebooted. Received same data error window. Rebooted. Received same data error window.
<input type="checkbox"/>	AM0106432367	AutoMARK	Team installer noted that the device is missing a battery cover. The result might be that the batteries become dislodged during transit. Needs a battery covery before being used.
<input type="checkbox"/>	AM0106432432	AutoMARK	A test team installer was unable to insert and seat the flashcard in the device. Examination showed at least 3 bent connector pins on the device. Gently attempted to seat a different flashcard. Would not seat. Bent pins prevent seating any flashcard.
<input type="checkbox"/>	AM0106432454	AutoMARK	Had a ballot paper jam. Cleared paper out of paper path. Yes-could see one side of ballots had voted marked. Rebooted and the device performed normally. On retest, received error on re-inserting Ballot #1 for review: "Paper misfeed. Please contact election official." Ballot was ejected. (Now an election official could see my ballot.) I removed the ballot. Error message goes away and is replaced by "Please insert your ballot." I re-inserted my ballot and the AM read it back to me correctly. It finished the test steps with no additional trouble.  Because of the initial difficulties, I inserted another marked ballot. Device responded with "Ballot has not been recognized." Ballot was ejected. I reinserted the ballot--it worked fine. I inserted another ballot, it worked fine.  Too many error messages reading and recognizing ballots.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input type="checkbox"/>	AM0106432471	AutoMARK	Connector prongs bent. Flashcard will not seat.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input type="checkbox"/>	AM0106432509	AutoMARK	The ballot feed is bigger that 8 1/2' ballot width. Leads to misfeeds

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input type="checkbox"/>	AM0206440361	AutoMARK	System made a very loud, grinding sound when booted up. Has a 3/4" cut on the touchscreen. The installer observed both flaws. Replicated sound on boot up.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input type="checkbox"/>	AM0206440407	AutoMARK	The AutoMARK™ experienced a paper jam during a ballot printing operation. The tester carefully pulled the ballot out of the device. At this time a pollworker would have been able to view the voter's choices printed so far on the ballot. While attempting to clear the paper jam error message, the tester was thrown to the Windows CE operating system at which time he was able to modify and delete critical system and application files. He was able to create a new Windows folder on the system. The tester reached the MS-DOS command prompt. The tester's actions rendered the AutoMARK™ and the flashcard inoperative, incapable of further use. The tester carried out all of these actions in a non-privileged account while following on-screen instructions. The Wake County and InfoSENTRY test team replicated the security flaw on two additional AutoMARKs™ indicating that it is intermittently present on all of the devices in Wake County.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input type="checkbox"/>	AM0206440423	AutoMARK	On Ballot #2, received "not recognized" five times. Changed ballot and it worked fine. Had difficulty getting device to accept an initially printed ballot for review. Then, had a paper misfeed. Then, "ballot not recognized." The scanned fine. On Ballot #3, did not recognize the ballot 4 times. Used another ballot. Did not recognize it on the first time, then worked. On Ballot #4, received 4 "ballot not recognized" errors. Then, with a new ballot, had a misfeed. Then it worked. Too many errors on input.
<input checked="" type="checkbox"/>	AM0106421249	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	AM0106421671	AutoMARK	Sounds squeaky when the ballot prints. Small specs of dirt underneath the touchscreen at the bottom.
<input checked="" type="checkbox"/>	AM0106430105	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	AM0106430129	AutoMARK	When using the ADA device, but switching back to the keypad, the machine froze and became unresponsive until I used the touchscreen (not the keypad). Buttons were sticking and pausing between selections.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106430316	AutoMARK	Outside case. Right side lock, latch release broke

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106430366	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106430606	AutoMARK	In use at early voting.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106430704	AutoMARK	In use at early voting.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106430733	AutoMARK	Tester had a misfeed on Ballot #2. Re-inserted ballot. Had to press <select> 10+ times before it would select "Patsy Cline" on ballot. Then "Barry White" was easy to select with the ADA device. Then had to press <advance> and <select> more times (20+) before it responded. Tester discovered on this ADA device that you have to hold the switch down for a long time instead of pushing it once.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106430755	AutoMARK	No anomalies noted.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

<input checked="" type="checkbox"/>	Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
		AM0106430759	AutoMARK	Pressed ADA "Yes" and had no problem on Ballot #1. Ballot #2--received initial "Ballot not recognized" message. Re-inserted. On Ballot #4, received "Ballot not recognized" error. Re-inserted. It worked.
<input checked="" type="checkbox"/>	Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
		AM0106430828	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
		AM0106430965	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
		AM0106431059	AutoMARK	On first ballot, received "Ballot not recognized" message. Re-inserted the ballot and it worked.
<input checked="" type="checkbox"/>	Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
		AM0106431180	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
		AM0106431193	AutoMARK	On Ballot #3, inserted ballot. "Ballot not recognized." Re-inserted. Worked fine.
<input checked="" type="checkbox"/>	Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
		AM0106431357	AutoMARK	No anomalies noted.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431360	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431453	AutoMARK	Received a comment that the tester had not seen before: "Loading your language before beginning."

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431460	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431686	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431695	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431698	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431708	AutoMARK	No anomalies noted.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431717	AutoMARK	Ballot not recognized on first try. Second attempt failed. Third attempt--okay.
✓	AM0106431718	AutoMARK	When summarizing a ballot during review, system audio does not finish sentences.
✓	AM0106431726	AutoMARK	When inserting a ballot back into the system to re-scan and verify the selections made, the system does not read back the name of the write-in--only that a write in was selected.
✓	AM0106431747	AutoMARK	Paper misfeed. Reinserted and worked okay.
✓	AM0106431777	AutoMARK	Device seemed noisier than others at startup and is noisier when ballot is scanned.
✓	AM0106431789	AutoMARK	No anomalies noted.
✓	AM0106431798	AutoMARK	No anomalies noted.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431802	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431824	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431825	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431837	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431838	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431843	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431851	AutoMARK	When inserting Ballot #3 blank ballot, ballot returned with an error message that ballot style was not recognized. Ballot #4: Fed bottom first, paper misfeed.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431853	AutoMARK	On boot-up, print cartridge message appeared. Re-booted and worked okay.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431857	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431865	AutoMARK	On the third ballot, the tester attempted to modify the already printed ballot by reinserting it into the device. The AM would not allow the tester to make any changes to the already-printed ballot. This is the correct response.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431866	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431872	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431875	AutoMARK	Ballot #1 misfeed. Ballot #2 received a "Ballot not recognized" error.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431876	AutoMARK	No anomalies listed.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431880	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431882	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431887	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431890	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431896	AutoMARK	It took 62 seconds to scan the first ballot after inserting it. System was slow scanning Ballot #2 and Ballot #4. When summarizing a ballot, "Best singer" the audio readback says "Vote for not more than t" instead of "vote for not more than two". It does not read the entire statement. On Proposition 1, it read back "Are you in favor of a t" instead of "Are you in favor of a three day weekend?" On proposition 2, the audio truncates the sentence to "should pay increase be" instead of finishing the entire sentence.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431899	AutoMARK	No anomalies noted.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431901	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431905	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431906	AutoMARK	<p>On second ballot, tester used the ADA box, then pressed the keypad to try to de-select. Received "AutoMARK error: Argument out of range exception: Please contact an election official." System allowed tester to continue voting.</p> <p>On second ballot, when inserting for review and verification, the touchscreen did not work properly. Repeated the effort to review ballot. Touchscreen function did not work.</p> <p>On third ballot, the touchscreen would not work at the required time, The ADA device and the keypad both work.</p> <p>Rebooted and the touchscreen worked. Appeared to require a reboot to make the touchscreen work.</p>

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431907	AutoMARK	

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431908	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431910	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431919	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431925	AutoMARK	System allowed tester to proceed without selecting a vote on Prop. 2. Does not appear to have been a problem. It was a standard undervote.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431937	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431941	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106431945	AutoMARK	No anomalies noted.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106431972	AutoMARK	On Ballot #1, paper jammed when ballot was being marked. Called test supervisor to clear the jam. Cleared by opening the cover to the paper path and removing the ballot gently. Was able to see what had been printed on the ballot prior to the jam. Had a paper misfeed on entry on Ballot #4.
✓	AM0106431978	AutoMARK	Paper misfeed.
✓	AM0106431987	AutoMARK	Ballot #4 had a paper misfeed. Re-inserted okay.
✓	AM0106432030	AutoMARK	Machine made a loud grinding sound on initial boot. Start properly. Rebooted. Operated and sounded normally. Paper misfeed. Reinserted ballot and worked okay. On another ballot, received a paper misfeed. Reinserted ballot unsuccessfully. Another misfeed. Had another misfeed and system performed okay.
✓	AM0106432048	AutoMARK	No anomalies noted.
✓	AM0106432124	AutoMARK	Paper misfeed. Removed the ballot and reinserted. 2nd paper misfeed. Inserted entirely new ballot and worked okay.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432134	AutoMARK	Ballot #3: button stuck when trying to get an unmarked ballot to come out.
<input checked="" type="checkbox"/>	AM0106432159	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	AM0106432162	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	AM0106432176	AutoMARK	Did not recognize print cartridge on initial startup. Re-seated print cartridge and re-booted. Worked properly.
<input checked="" type="checkbox"/>	AM0106432186	AutoMARK	Ballot #4: When tester tapped the screen in such a manner to press items on the top and bottom of the musician list, the system highlighted the name in the middle of the list--Billie Holiday.
<input checked="" type="checkbox"/>	AM0106432189	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	AM0106432200	AutoMARK	No anomalies noted.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432215	AutoMARK	No anomalies noted.
✓	AM0106432223	AutoMARK	When first advancing to first contest, button turned white and screen froze for a few seconds.
✓	AM0106432232	AutoMARK	Ballot #4 received error message: "Ballot has not been recognized." Reinserted ballot.
✓	AM0106432240	AutoMARK	No anomalies noted.
✓	AM0106432256	AutoMARK	On Ballot #3, had to touch <exit-return> ballot three times to get back a blank ballot. On Ballot #4, tried to overvote. Screen froze with message. Had to touch <ok> 4 times to get back to the contest.
✓	AM0106432261	AutoMARK	No anomalies noted.
✓	AM0106432263	AutoMARK	Typically takes about a minute to print a ballot.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432265	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432277	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432280	AutoMARK	On initial boot, received error that print cartridge missing. Re-seated print cartridge. Rebooted. System worked.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432284	AutoMARK	Failure to recognize print cartridge. Re-seated print cartridge--worked properly. Inserted ballot, received error: "Ballot not recognized." Second insert: "Ballot not recognized." Third insert: "Paper misfeed." Fourth insert: "Ballot okay." The audio stated that it would take 15 seconds to print the ballot. It took 60 seconds before the ballot was returned. Fourth Ballot, received "Ballot not recognized."

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432300	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432302	AutoMARK	No anomalies noted.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432323	AutoMARK	No anomalies noted.
✓	AM0106432327	AutoMARK	No anomalies noted.
✓	AM0106432340	AutoMARK	On Ballot #4, had long response pause when touching multiple screen points simultaneously. Selected and de-selected write-ins, each time with the effect of the buttons getting stuck.
✓	AM0106432342	AutoMARK	On second ballot, did not recognize ballot on the 1st try. Worked fine on the 2nd try. On the fourth ballot, did not recognize ballot on 1st try. Worked fine on 2nd try.
✓	AM0106432343	AutoMARK	No anomalies noted.
✓	AM0106432345	AutoMARK	Paper misfeed on fourth ballot. Reinserted, worked okay.
✓	AM0106432353	AutoMARK	Made a user error during the second ballot. I could not seem to press the right button, so I accidentally printed my ballot before making all selections.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432356	AutoMARK	Did not recognized print cartridge on booting. Replaced cartridge. Rebooted. Worked properly.
<input checked="" type="checkbox"/>	AM0106432358	AutoMARK	At boot-up, received message that "couldn't find print cartridge." Removed and readjusted print cartridge. Worked.
<input checked="" type="checkbox"/>	AM0106432363	AutoMARK	Zoom button requires 3 or 4 or 5 presses before it reacts. The touchscreen seemed a little slow to react.
<input checked="" type="checkbox"/>	AM0106432366	AutoMARK	No anomalies noted.
<input checked="" type="checkbox"/>	AM0106432371	AutoMARK	Working on second ballot. Ballot went in. Scanning bar did not indicate progress at 1:35pm. Turned off machine at 1:40pm. Removed ballot. Rebooted the system. Performed this step twice, accurately. Tester comment: Election worker can see ballot while removing it from the machine, including ballot choices. OR the voter might attempt to take the machine apart to retrieve the ballot.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432372	AutoMARK	Note that the battery only had 3 bars. On several occasions, the tester did not enter a response as instructed by the audio module. (The screen was darkened.) The system waited for 5 minutes to alert the tester that the session was not active. At that point, it gave the tester instructions to continue. Tester made an error in the final selection to print the final ballot. The result was a blank ballot.
✓	AM0106432376	AutoMARK	On entering second ballot, received error message "Ballot has not been recognized." Re-inserted ballot, worked okay.
✓	AM0106432392	AutoMARK	No anomalies noted.
✓	AM0106432396	AutoMARK	No anomalies noted.
✓	AM0106432397	AutoMARK	No anomalies noted.
✓	AM0106432398	AutoMARK	On Ballot #2, did not register ADA advance, eventually skipped to the next button.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432399	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432401	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432402	AutoMARK	Received ballot not recognized message. Reinserted ballot and all worked okay.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432403	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432405	AutoMARK	Tester was unable to deselect a write-in with the select button. It just keeps adding to the write-in name. You can "deselect" a candidate by pressing select. You have to press the back button to de-select a write-in. Did not find instructions for that function.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432407	AutoMARK	"Ballot not recognized" and automatic ejection. Reinstalled. Okay.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432409	AutoMARK	Did not accept blank ballot on first try. Second try successful.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432413	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432418	AutoMARK	on Ballot #2, "Ballot not recognized"--retried--it worked.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM010643242	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432420	AutoMARK	Noted once again that the audio often would not finish sentences when reviewing ballots.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432421	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432422	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432424	AutoMARK	No anomalies noted.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432428	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432430	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432436	AutoMARK	At startup, received message that "Print cartridge was missing." re-inserted cartridge, rebooted, and machine worked properly. When scanning ballot back in to verify, AM indicated "ballot not recognized." Tester re-inserted ballot and AM worked fine.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432439	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432444	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432445	AutoMARK	Received "data error: failure to calibrate the following scanners: PV." Press <OK> button repeatedly, no effect. Touched other screen areas repeatedly. No effect. System froze. Had to reboot. System worked properly through remainder of the test. ADA device slow on last selection.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432446	AutoMARK	The battery check initially was short by 2 bars. All bars lit by end of testing. On the first try of inserting a ballot, received a "Ballot not recognized" error message. Succeeded on second try.
✓	AM0106432447	AutoMARK	ADA device was not sensitive to selection. Answers would not register right away.
✓	AM0106432448	AutoMARK	No anomalies noted.
✓	AM0106432449	AutoMARK	Tester had to press <Select> about 10 times before system would select "yes" using ADA device.
✓	AM0106432452	AutoMARK	Tester noted that the audio does not always complete sentences when summarizing.
✓	AM0106432458	AutoMARK	No anomalies noted.
✓	AM0106432459	AutoMARK	No anomalies noted.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432460	AutoMARK	Misread third ballot. Worked fine upon re-insertion.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432462	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432464	AutoMARK	Inserted 2nd ballot. Received message "Ballot has not been recognized." Re-inserted ballot. Worked okay.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432465	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432466	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432467	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432468	AutoMARK	No anomalies noted.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432469	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432476	AutoMARK	Ballot #3--message on insert "Ballot not recognized." Reinserted ballot. Worked okay.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432477	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432478	AutoMARK	Failed to recognize print cartridge on startup. Re-seated print cartridge. Re-booted. Worked properly.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432482	AutoMARK	This machine seems exceptionally noisy when it moved a ballot in or out.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432483	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432484	AutoMARK	No anomalies noted.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432492	AutoMARK	Ballot #1 paper misfeed. Tester just reinserted the ballot even though the machine instructed to contact an election official. Tester noted again that she had press the ADA device several times to get it to choose yes or no.
✓	AM0106432495	AutoMARK	No anomalies noted.
✓	AM0106432496	AutoMARK	Application boot in progress. Received error messages. Rebooted, turned on, same error. Message "Data error." Worked on re-test.
✓	AM0106432499	AutoMARK	
✓	AM0106432500	AutoMARK	Will not return to ADA until long pause if you switch to the keypad while selecting.
✓	AM0106432501	AutoMARK	Has to press very hard to get the <zoom out> button to work. <zoom in> was no trouble.
✓	AM0106432504	AutoMARK	<zoom out> button--tester had to press it several times to get it to work. <zoom in> always worked on the 1st touch.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432507	AutoMARK	
✓	AM0106432511	AutoMARK	No anomalies noted.
✓	AM0106432512	AutoMARK	No anomalies noted.
✓	AM0106432517	AutoMARK	No anomalies noted.
✓	AM0106432518	AutoMARK	During write-in, with screen in dark mode, spacing is not simple. Tester was unable to space after first initial. After 2, selected <space>, computer repeated first letter selection.
✓	AM0106432520	AutoMARK	On Ballot #3, received "Ballot Not Recognized" error. Worked on second try.
✓	AM0106432521	AutoMARK	Would not let me press <OK> when it said I overvoted. It finally took me to the next screen, after a long wait. ADA would not register, used touchscreen.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432524	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432525	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432532	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432537	AutoMARK	

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432550	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432568	AutoMARK	Ballot initially not recognized upon insertion. Reinserted--okay,

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
<input checked="" type="checkbox"/>	AM0106432752	AutoMARK	Initially did not find print cartridge on booting. Re-seated the print cartridge. Rebooted. System worked.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0106432755	AutoMARK	No anomalies noted.
✓	AM0106432778	AutoMARK	On Ballot #2, the tester had the ADA device advance through Prop 2, advance through the summary and advanced to Mark Ballot. AutoMARK printed the ballot by using <advance> rather than <select> which resulted in a partially marked ballot.
✓	AM0106432790	AutoMARK	No anomalies noted.
✓	AM0106432795	AutoMARK	No anomalies noted.
✓	AM0106432799	AutoMARK	Advance button on the ADA device would not budge. Use touchscreen to move.
✓	AM0206440285	AutoMARK	No anomalies noted.
✓	AM0206440309	AutoMARK	To use the touchscreen had to press very hard and hold screen to make the selection change.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440409	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440428	AutoMARK	Tester had to touch zoom twice to get it to work.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440468	AutoMARK	ADA device was very slow when moving back and forth between keypad and device. Touchscreen seemed slow to respond--especially on Ballot #4.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440491	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440582	AutoMARK	No anomalies noted during testing. Following the discovery of the security flaw on another machine, we used this device to determine the status of the flashcard that the test supervisor had been able to penetrate on the failed machine. The attached photo shows that this machine could not ready the corrupted flashcard. Afterwards, verified that this device functioned properly.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440655	AutoMARK	No anomalies noted.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440784	AutoMARK	Difficulty in jacking in the ADA switch.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440815	AutoMARK	Received error on re-inserting first ballot for review. Paper misfeed. Re-inserted ballot. Worked okay. Ballot #3 not recognized. Re-inserted. Worked okay.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440864	AutoMARK	

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440925	AutoMARK	Upon inserting 2nd ballot, got the following message: "Paper misfed. Please contact election official." Worked when re-inserted ballot.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440930	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206440930	AutoMARK	ADA device slow on last selection.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441008	AutoMARK	No anomalies noted.

Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441031	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441037	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441041	AutoMARK	System apparently did not notify of undervote in Proposition 2 on the second ballot. Received ballot not recognized error. However, the error cleared when tester followed on-screen instructions and the system worked through the remainder of the test.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441046	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441048	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441049	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441055	AutoMARK	No anomalies noted.



Wake County AutoMARK(tm) Voter Assist Terminal: Limited Scope User Acceptance Test Summary Report

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206441057	AutoMARK	No anomalies noted.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0206461	AutoMARK	The device does not register the selection if you place your entire hand on the screen. Must use a finger, knuckle, or pointing device. This is a proper characteristic of the device.

Checkmark = Pass	Serial_Number	Device_Type	Wake_Receipt-Test_Comments
✓	AM0306440339	AutoMARK	No anomalies noted.

## Attachment 2: Selected Results of Security Incident

This attachment contains a few photographs demonstrating the degree to which the test team gained control of the AutoMARK™ system on three occasions. We have presented only a fraction of the photographs. We show only photographs of actions inside the Windows CE operating system after we got to that system.

We do not show photographs of the situations and steps that led up to our ability to get to the Windows CE operating system. We have deleted the names of some folders and files in the photographs in order to prevent disclosure of information that might make it easier for someone else to attack the system. We have attempted to comply with reasonable and ethical security examination expectations that we should not provide a roadmap for someone else on how to gain entry into the system—only conclusive indications that we did so in the course of legally and contractually authorized User Acceptance Testing and generally what we were able to do when we gained the access.

We have provided more detailed information verbally to the State Board of Elections and ES&S in order to assist them in mitigating the specific security issues we found during this UAT. ES&S indicates that the firm is applying modifications to future versions of the system in order to reduce or eliminate the abilities to modify the system as we did on three separate devices. (Please see the letter from ES&S in Attachment 3.) The Wake County Board of Elections is already developing procedural and security awareness steps to reduce the likelihood that any individual, through malicious intent or inadvertent actions, will render an AutoMARK™ inoperative through this security hole.

We reiterate that this work does not constitute a security assessment or security test of the AutoMARK™ system. We found nothing in this portion of the UAT to indicate that the device stores or tabulates votes. Therefore, these results do not reflect on the accuracy with which the device prints ballots to reflect the intent of the voter.

Photo 1 displays the initial problem that occurred on the system, along with the suggestion to contact and election official.

**Photo 1**

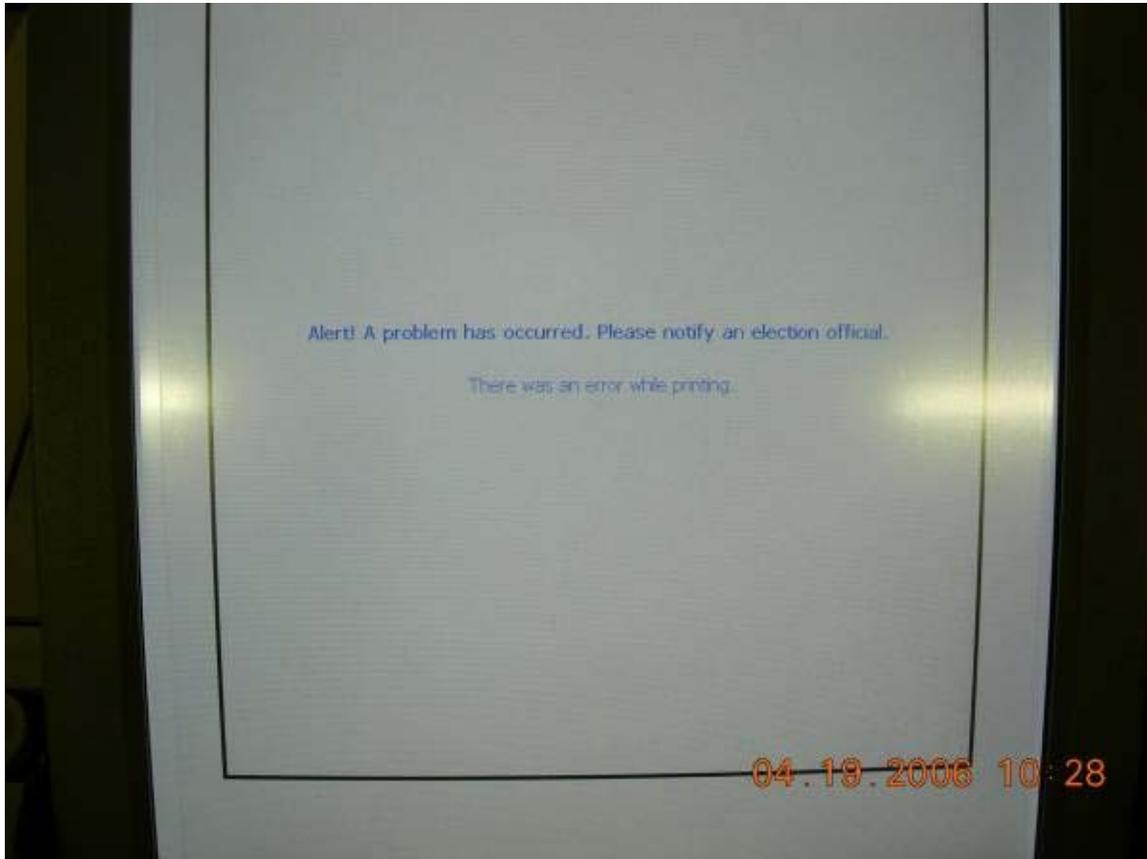


Photo 2 shows that after executing a sequence of events on the device the poll worker or voter came to a familiar position in the Windows CE operating environment. We have redacted the names of certain files and folders in this photo.

From this point forward, we conducted all of our work in the operating system by using the computer's touchscreen capabilities and a graphical user interface keypad that presented itself on the screen from time to time.

**Photo 2**

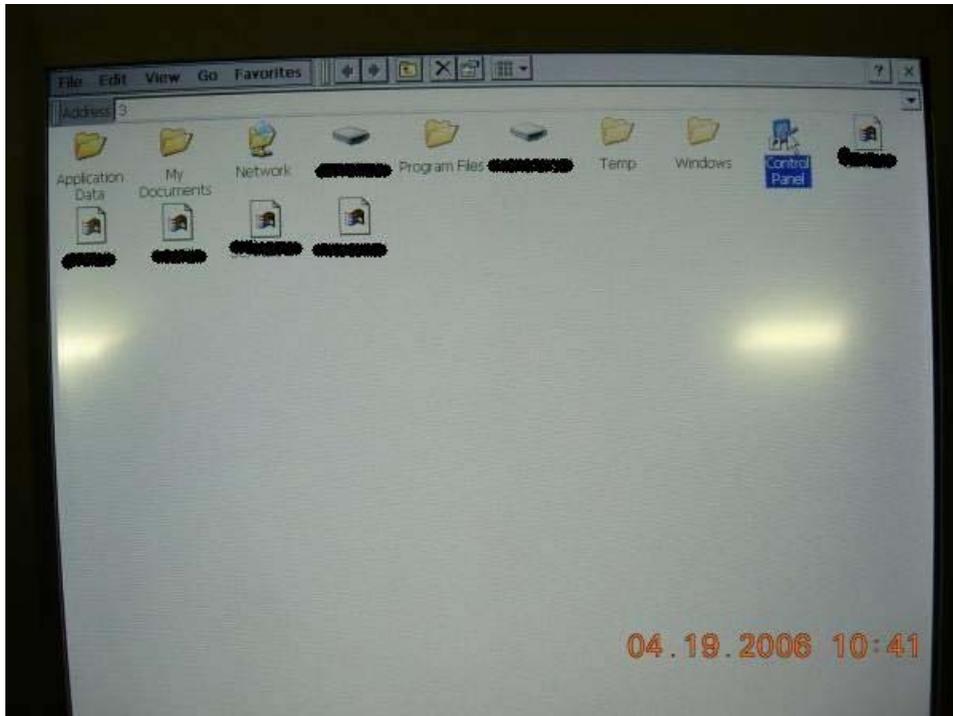


Photo 3 shows that after using the touchscreen to initiate a series of file deletions, we received a confirmation to delete from Windows.

**Photo 3**

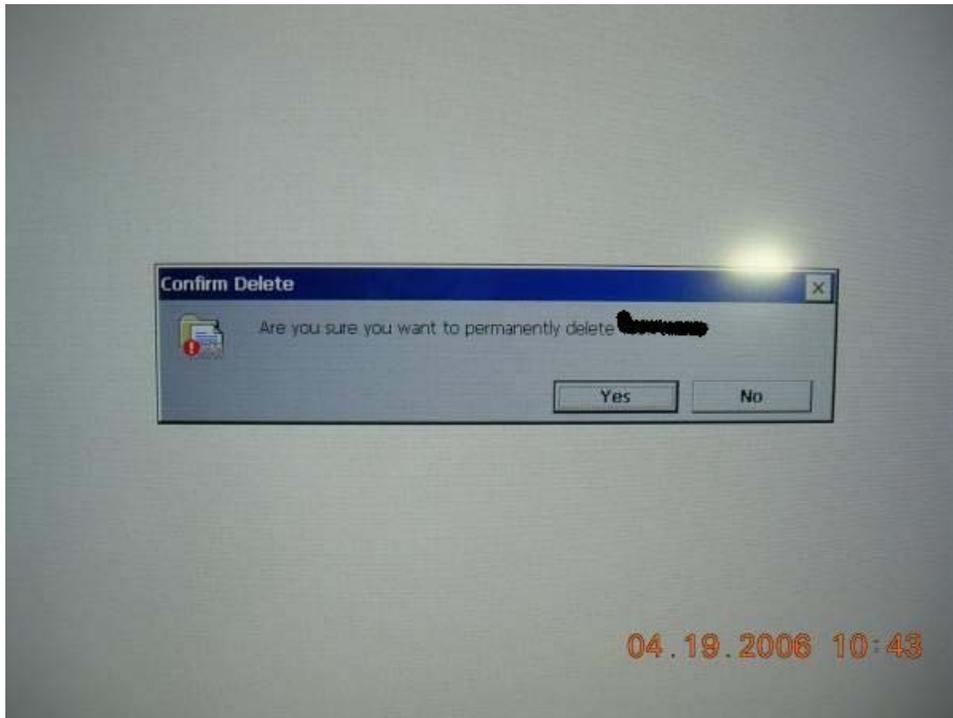


Photo 4 indicates that we were deleting files from system folders and came across a particular file for which the operating system requested another confirmation before deleting the file.

**Photo 4**

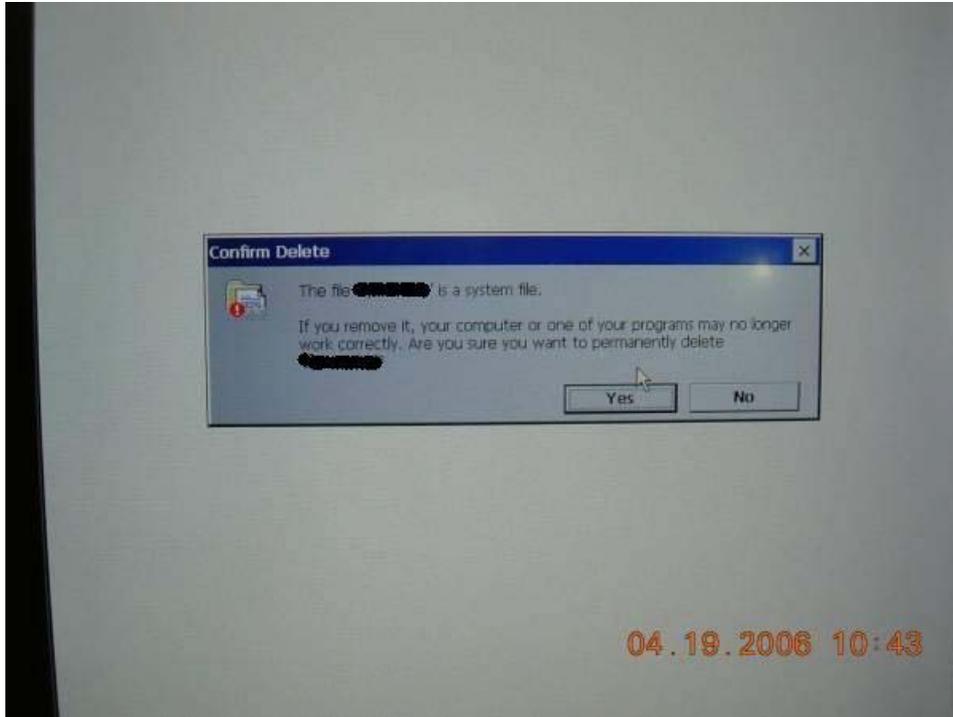


Photo 5 indicates that Windows operated as it should in this instance by refusing to allow us to delete this file.

**Photo 5**

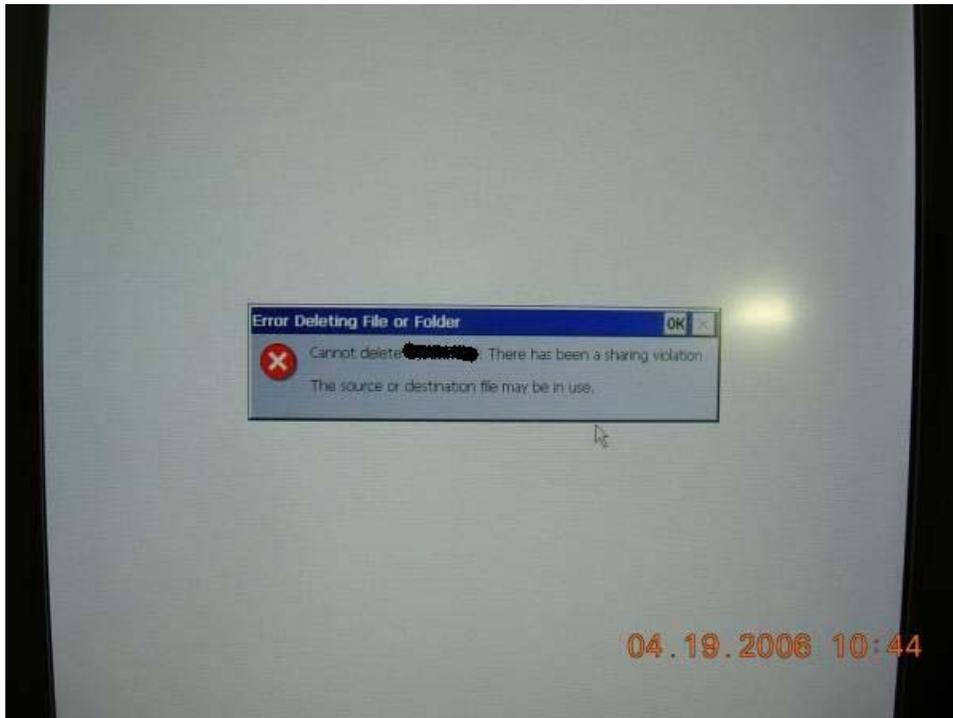


Photo 6 also shows that the Windows CE operating system would not allow us to delete the file, although it clearly shows that we were in the Windows CE operating environment.

**Photo 6**

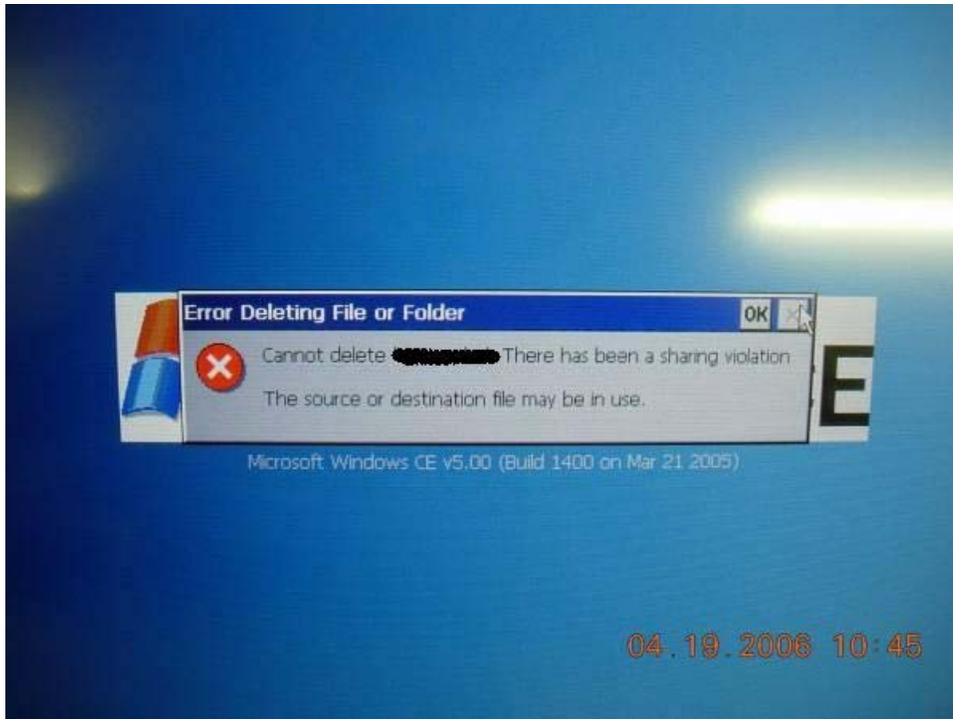


Photo 7 shows that we were able to locate the familiar MS-DOS command prompt icon while we were in Windows CE.

**Photo 7**



Photo 8 shows that after double tapping on the MS-DOS icon, we arrived at the MS-DOS command prompt.

**Photo 8**

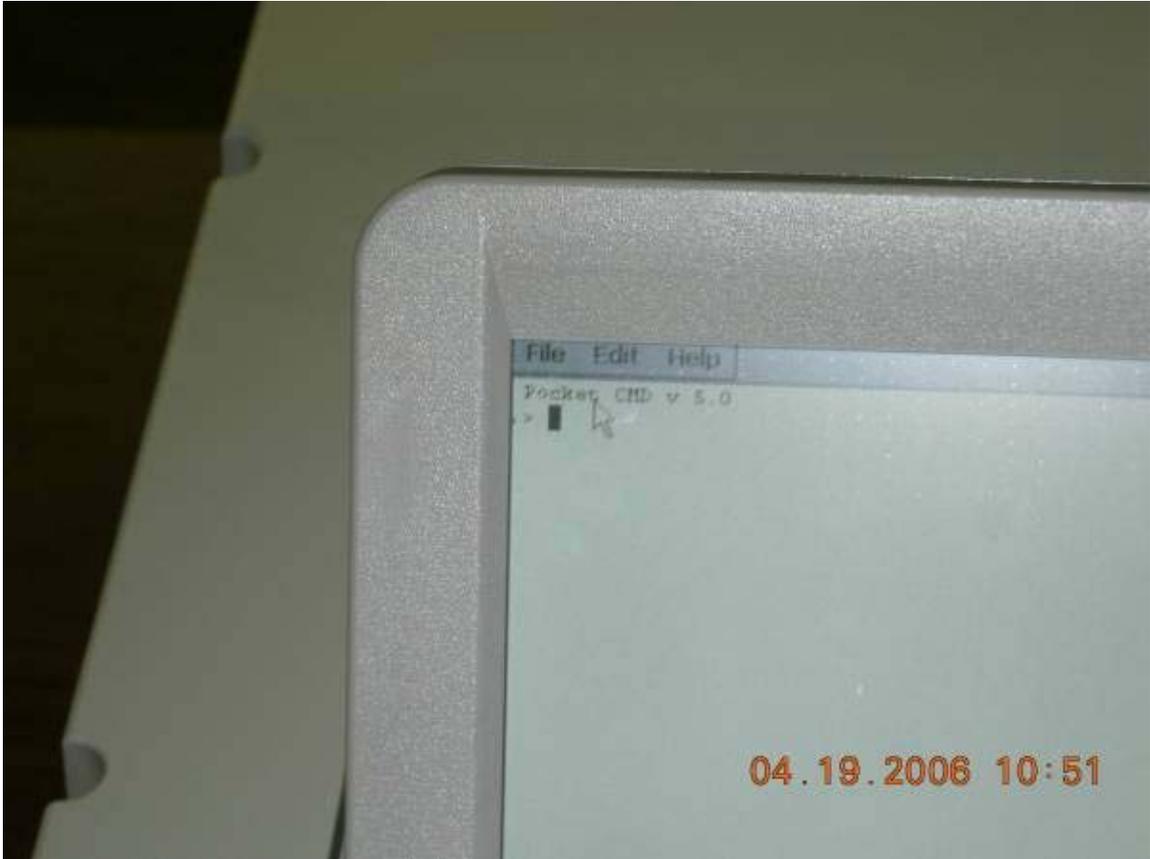
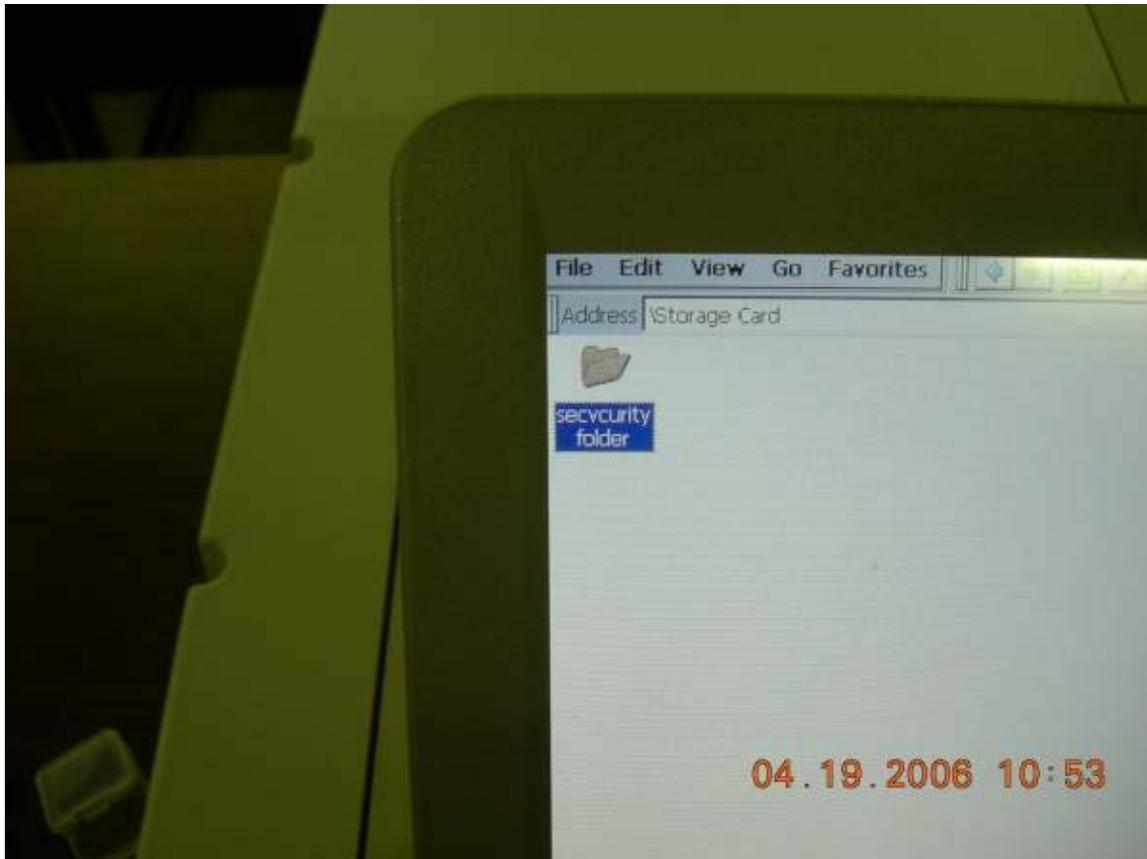


Photo 9 demonstrates that we were able to create a new folder that was not on the system before. The Windows CE operating system conveniently provided us with a touchscreen keypad, like the one used in voting, in order to enter the folder name.

**Photo 9**



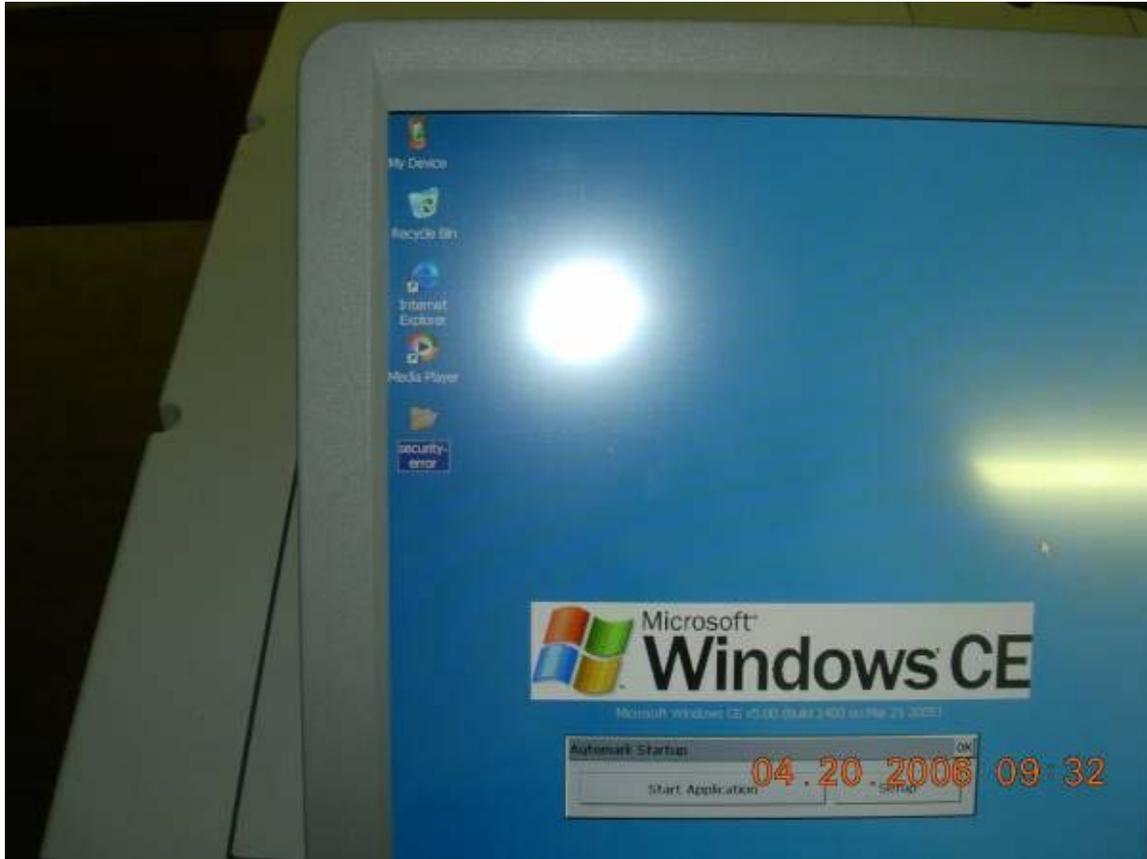
At this point we were convinced that we had demonstrated sufficient control over the system to terminate our operating system examination. We removed the flash card from the AutoMARK™ on which we had been working and took it to an AutoMARK™ that had just passed user acceptance testing. When we booted that AutoMARK™ it was unable to recognize the flash card we had brought from the previous machine. That failure indicated to us that we had corrupted that flashcard sufficiently during our file deletions to render it inoperative.

We went back to the AutoMARK™ on which we had performed the security exploration and inserted into it a flashcard that we knew to be fully functional. However, this system failed to boot at all. That failure indicated to us that we had corrupted critical system files and rendered that system completely inoperative.

Two additional incidents occurred on the final day of testing that allowed the testers to move once again to the Windows CE operating system. These activities replicated much of what we did on the previous days—except that neither incident began with a paper jam as did the incident on the preceding day.

Once we were in the operating system on these subsequent two replications of the error condition, we carried out many of the same exploration and file manipulation activities that we did on the 19<sup>th</sup>, including: view directories, delete files, and add folders. Photo 10 is from the first of the two incidents.

**Photo 10**



This photo demonstrates one issue that is almost certainly one involving perception more than reality. Wake County has never connected any of its voting system devices to the Internet. However, the third icon from the top on the AutoMARK's™ Windows CE desktop is for Internet Explorer. The vendor indicates that the AutoMARK™ cannot connect to the Internet. Because this test was not designed as a security or source code test, we did not attempt to verify that assertion. We simply accept it as accurate.

However, the existence of the icon, if simply discovered by a pollworker or voter, might create an inaccurate perception that this device can connect to the Internet. We suggest that the vendor remove or obscure the icon in subsequent releases of the system and provide third-party assurance that the system cannot under any circumstance connect to the Internet—in line with the Wake County Board of Elections' standard operational procedure.

We conclude with a notation that the situation from which we were able to trigger the security breach to the operating system is not one that we found to be uncommon on the AutoMARK™. Also, we note that we were not 100% successful in triggering the security breach at will. Therefore, it is likely that this security situation is one that is intermittent on the AutoMARK's™ in Wake County.

## **Attachment 3: Letter from ES&S Regarding the Security Incident**



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Ms. Cherie Poucher  
Director of Elections  
Wake County Office Building  
339 South Salisbury Street  
Raleigh, NC 27601

Dear Ms. Poucher:

This letter is in response to the issue you experienced during your testing with the ES&S AutoMARK. The issue relates to the version of ES&S AutoMARK firmware that is certified to run in your state.

The issue allows – in very rare instances - a person with the physical key required to start-up the ES&S AutoMARK to gain access to the system administration functions normally reserved for our System Technicians. This access *only* can occur if someone has the proper key and *only* if the display screen is touched at a precise moment during system boot up. Further, the issue *will not* occur if written procedures for booting up an ES&S AutoMARK unit are followed correctly.

Importantly, even in the rare instance that access is gained, please note that no votes are stored in the ES&S AutoMark. Therefore, no votes may be deleted or changed. In addition, the ES&S AutoMARK is equipped with layers of security – physical and within the software and firmware – to protect against unauthorized and/or malicious modifications to the functioning of the equipment.

Because at ES&S we take seriously every potential concern – no matter how remote – we have already developed a technical solution to mitigate the issue. This technical solution has been approved by SysTest Labs, our independent testing authority. SysTest's report is now pending NASED/EAC review. We anticipate the solution will be available for state certification by the end of next month.

Again, we wanted to keep you apprised of this issue. As always, please call me at (402) 970-1215 if you have any questions or comments.

Ken Carbullido  
Sr. Vice-President, Software Services & Product Development

CC: Gary Bartlett, Executive Director NC SBOE