

**Subject: Review of May 2, 2006 Primary Election
in Cuyahoga County and Recommendations for the
November General Election**



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Introduction

Ron Olson worked as an Election Day Technician (EDT) on May 2, 2006 and gathered detailed notes on what he saw and experienced during the training sessions, the Monday night organizational meeting and Election Day.

Having worked in Information Technology since 1978, Ron has considerable background solving problems with people, computers and software. He feels this experience was very useful on election day and hopefully in making recommendations for improvement in the future.

This evaluation is part of a CASE (Citizens' Alliance for Secure Elections) project named "**Adopt A BOE**" to work constructively with Ohio BOE's to improve the election process.

The report contains

- CASE recommendations (both general and specifically for Cuyahoga county)
- EDT report and recommendations for Cuyahoga county
- Summary of Cuyahoga election process for readers who are not familiar with it (read this first if you are not familiar with the details)

CASE Recommendations

- 1.** Candidate and issue results should be posted at each polling place. If possible, results should be separated by precinct. Copies of the final reports should be kept by each Presiding Judge and EDT.
- 2.** Full auditing should be done before memory card totals are downloaded or sent to the BOE. Signature book totals should be checked against voting machine totals for the polling place, or if possible, each precinct. Provisional and optical ballots should be included. Discrepancies should be resolved or documented by the Judges.

There was effectively no auditing of vote totals by precinct Judges since signature counts are not compared against vote totals (even for the entire polling place). For example, if Ron had accidentally not loaded a memory card, no one at the precinct would have

known. Resolving these discrepancies at the BOE means decisions are made by people who were not at the polling place.

3. If ballots or memory cards are taken to an intermediate location (e.g., for downloading remotely to the BOE), a Presiding Judge from each party should be present.
4. Downloading accumulated vote totals via modem seems to add unnecessary risk (even if the rather loose procedures on May 2nd are improved).
5. The BOE should publish the procedures that are followed at the BOE after memory cards and optical scan ballots are received. These must include audits of memory cards and signature book counts and are very important. The public should be able to witness these procedures being performed.
6. A random sample of precincts should be recounted with outside observers from the canister tapes following each election to evaluate voting machine accuracy. The audit should be expanded if problems are found.
7. A recount with outside observers from the canister tapes should be performed for any machines that had problems reported on election day.
8. Access to Voting Machine source code should be demanded of the vendor. The source code should not be published because it would add to the risk of fraud. However, the BOE should be able to have experts review the code to determine, for example, the risk of vote counting being compromised when the two units froze on May 2nd.

Voting machine vendors risk little by providing this access. They provide hardware, software, and support. The value of the software is a small part of the value they provide to a customer.

9. While we support BOE use of independent companies (such as ESI) to investigate and review the election process, the natural desire of such companies to obtain additional contracts creates an inherent conflict of interest that works against reporting too much “bad news”. We hope BOE’s will also make use of organizations like CASE who can provide a independent view of the situation and have no financial incentive.

EDT Report/Highlights

- Polling place: Mayfield Heights, Cornerstone Community Church.
- Precincts: D, H, I, K, O
- Two Election Day Technicians (EDT). One had little technical/computer experience
- Setting up the voting machines on Election Day was slowed down by some mistakes in the Booth Official Training Manual. However, with some trial and error experimentation, we were able to get at least one machine working in each precinct by 6:35 AM.

It is easy to see how these problems could completely stop the setup of all voting machines for an EDT who was unable to figure out (guess) what the right steps were.

- Voters only had to wait a few minutes to get started, there were no significant lines, and closing/accumulation went fairly smoothly. If voter turnout had been higher, the story might have been different.
- Two voting machines froze during the day and one had to be removed from service.
- Closing including accumulation went smoothly (although it is slow because two copies of very long reports have to be printed).

EDT Report/Training

- Five hours of training at the Cuyahoga County BOE
- Well organized, serious, knowledgeable instructors
- Used entire five hours.
- Provided absentee ballot applications and precinct assignments at the training (well organized)

Problem/Issue	Recommendation	Priority
1. In hindsight, there was too much time spent practicing unfolding and packing up unit (booth officials did all machines) and not enough time spent practicing opening and closing procedures.	Spend less time on physical setup, power. Include more hands on time practicing setup/closing procedures.	Med
2. Training and instruction manuals are crucial and improvements need to be made.	Outside organizations (such as CASE) can help with <ul style="list-style-type: none"> • Reviewing manuals • Reviewing BOE procedures • Suggesting training improvements • Holding practice elections 	High

EDT Report/Monday night Organization meeting

Getting started

- Precinct Judges arrived on time or early and were very active in getting precincts setup.
- Precinct Judges unpacked and stood up all voting machines although they made some mistakes in power cord connections.
- One Judge for precinct D did not show up. The BOE was informed but had no information about the absence or how to contact the missing Judge.

- As the Monday night meeting starts, the EDT is immediately overwhelmed. The EDT is supposed to meet all the judges, help with machine allocation/setup, and help check supplies. He/she becomes the bottleneck and has to wait on some tasks.

Problem/Issue	Recommendation	Priority
3. No information was available about missing Judge	Presiding Judges should have contact information for each other and all judges	Med
4. EDT is overwhelmed by requests/tasks at Monday meeting	Manual should clarify Monday night steps and consider that there are many Judges and only one EDT. For example, Judges should check supply bag and provide a list of missing materials to EDT to communicate to BOE. Also, Judges could set up the voting machines and the EDT could check the setup afterwards	Med

Unpacking voting machines

- Booth officials started taking machines from closet without consulting with EDT. Perhaps they do not need to, but there was no organization or process to selecting machines for a precinct. There was no indication of how many machines should go to each precinct.
- The Zero Unit voting machine (which is used during closing to accumulate vote totals for the polling place) was not marked.
- Boxes with printer housing were stacked too high and fell over causing some to be hard to attach to voting units.

Problem/Issue	Recommendation	Priority
5. Precinct Judges took voting machines arbitrarily for their precinct.	Instructions in the manual and attached to the voting machine should either specify the machine allocation or direct judges to consult the EDT.	Med
6. The Zero Unit voting machine was not marked.	If the Zero Unit machine must be a specific machine, it should be marked clearly with some identification that cannot be removed.	Med
7. Separate boxes with canister housing fell over before the Monday night organization meeting.	Canister housing boxes should not be stacked higher than two levels or should be secured against falling.	Low

Setting up voting machines

- Voting machines were separated by precinct and setup side by side against the wall behind each precinct table which did not provide much voter privacy. The reasons were
 - Presiding judges wanted their precinct machines separate from others so they would not lose their Voter Access Cards.
 - Power was available at the wall and stretching cords to an open area on the floor would create a tripping hazard.
- One booth official (a High School student) sealed the printer canister on six of the 15 voting machines on Monday night. Since there were no extra seals, we realized it would not be possible to setup those machines (e.g., run and have judges sign the zero report) on Tuesday morning. We called BOE at 440.845.0181. The person was not very interested in what our specific problem (needing seals) was. She just said that Diebold would be at the polling place at 5:30 AM to help.
- Two machines needed to be taped to stand up properly because buttons on legs would not come through the hole to lock. These machines fell over during the night and had to be put back together in the morning
- The printer housing on one unit (SN 24115) was very difficult to close. Later on Tuesday morning, we got the housing to close and lock.

Problem/Issue	Recommendation	Priority
8. Separating precinct voting machines by precinct reduced practical solutions to voter privacy.	<p>In the manual, emphasize the importance of privacy and document suggestions for providing privacy without making it difficult to keep track of voter access cards.</p> <p>Since the power cord issue will work against the horseshoe pattern, tape should be provided to hold down and cover the power cords. It may be necessary to provide one long extension cord for each precinct.</p>	High
9. Some printer canisters were sealed on Monday and could not be used Tuesday morning until extra seals were delivered.	<p>This is documented, but instruction manual should perhaps be organized more around each event (i.e., Monday night, opening, voting, closing).</p> <p>Extra seals should be available.</p>	Med
10. BOE staff indicated Diebold would arrive Tuesday at 5:30 AM to bring extra seals and no	It is inappropriate to rely on Diebold staff for BOE responsibilities.	Med

Problem/Issue	Recommendation	Priority
one arrived at 5:30AM.	The supplies needed should have been cataloged and added to a prioritized list of supplies needed by each polling place.	Med
11. Two machines would not stand up without being taped and fell over during the night.	Duct tape should be provided in the supply bag of the first Precinct.	Low
	Manual should suggest that machines with stability issues should be assembled Tuesday morning.	Low

EDT Report/Election Day Setup

- We were barely able to get one machine running for each precinct by 6:35 AM on Tuesday. There were too many things to do at once and some mistakes in the instruction manual caused delays
 - After inserting the memory card (6.6 in Booth Official Manual) we received an error that “Printer not responding”. The EDT Troubleshooting section helped us determine that this was because there was no paper (although it took some time). However the paper is installed in the following step, so this error will always occur.
 - It took awhile to print the Zero Totals report because we never saw the “Pre Election Mode’ on the screen. After inserting memory card and paper and clicking OK on a dialog, the report started printing. We were glad to see it, but the steps were different from the manual and we could have guessed wrong about what action take. **If we had not guessed correctly, it is easy to imagine getting stuck, calling the BOE, waiting for a response and having no voting machines available for use for minutes or hours.**
- We identified the Zero Unit by writing “Zero Unit” on a post-it and attaching it to one machine in first precinct.
- Promised supplies (extra seals) did not arrive at 5:30 AM. We noticed that each precinct had one extra paper canister and a seal for that canister. We used the extra seals to get at least one canister setup for each precinct
- After machines were setup and being used, we noticed the orange page “Additional Election Day Instructions” that said that the number on the memory card label should match the number on the voting unit label. It was too late to do anything about this, but even in hindsight, it is not clear to me what we were supposed to do. Specifically, what number on the memory card is supposed to match which number on the voting unit label (and what is the voting unit label)?
- EDT table was setup with precincts maps facing main entrance.

- When all voting machines for a precinct were taken, voters were directed to machines for other precincts.
- Only a few voters came to the wrong polling place and they were directed to polling place for their residence.
- There were only a couple of provisional voters (that I am aware of).
- Most voters went right to their precinct table because the Judges picked the same locations in the Church as they had in the past.
- Some voters did not know they could watch their choices being printed. A few wanted to be able to get a receipt with their choices.
- One voter who could not stand for long wanted to put voting unit on a table. One judge heard this was possible, but an error message was displayed when unit was removed, so we did not do this. We moved a chair in front of the voting unit and adjusted angle of voting unit to make it more readable (although privacy was further reduced).
- One voting machine (SN 225123) froze once after Next was selected on the Instructions page. After the EDT was summoned, the voter was given a new Voter Access card and allowed to vote on a new machine. Eventually the timeout/inactivity mechanism took over, the ballot was cancelled and the card returned to the Judges.
- Another voting machine (SN 257451) froze twice consecutively around 6 PM. We took the unit out of service.
- A voter with arthritis had trouble touching the boxes on the screen.

Problem/Issue	Recommendation	Priority
16. Many voters did not know they could review printed results.	The manual should indicate that the door should be opened. A sign pointing to the window might be affixed to the housing to catch the voter's attention and explain what they the printer window is for.	High
17. Judges had different opinions on whether the voting machine unit could be removed from the stand (and thus from the printer) for voting.	The training manual should clarify if the voting machine can be removed from the stand and used. If this is possible, the manual should describe how the voter can confirm his/her choices and have them recorded on the paper tape.	Med
18. A voter with arthritis had trouble touching the boxes on the screen	Judges should be informed that a capped pen (so it does not mark the screen) works well in this situation.	Med.
19. Two voting machines froze during voting	The individual machines should be tested and corrected or retired	High

Problem/Issue	Recommendation	Priority
	as necessary. BOE post election procedures should include a check of canister results against memory card results for machines that freeze.	

EDT Report/Election Day Closing

- There were no lines at closing time.
- No voter access cards were lost (that I am aware of).
- Everyone is tired & wants to leave. This is understandable after a 14 hour day, but works against accuracy when auditing vote counts and keeping track of memory cards.
- Reports (two copies) take a long time to print
- Certificate #1 completion checks were done, but no verification of signature counts and ballots cast was done.
- Memory cards were monitored closely during closing and accumulation.
- During accumulation, the red button was accidentally pushed while loading the next to last memory card. There is a highlighted warning not to do this in section 11.4 of the manual. After powering the machine back on, it displayed totals for each voting machine already loaded, so no re-loading had to be done.
- This precinct was used as a drop-off point for other Mayfield Heights precincts..
 - BOE personnel were on hand to monitor all the supply bags.
 - No Judges remained, so only one EDT was monitoring this activity.
- This precinct was used to transmit results via modem to the BOE.
 - A separate voting machine was connected to a phone line outside the room where the voting was done.
 - One BOE employee was gathering Zero Unit cards from each red supply bag while the other employee uploaded them into the voting unit.
 - There was some difficulty getting this to work initially.
 - The download mechanism was a modem connected to the COM1 port and dialing a 216 number presumably at the BOE.
 - The userid and password were the same and were printed in large characters on a one page sheet of paper and no attempt was made to conceal this sensitive information.

Problem/Issue	Recommendation	Priority
20. Closing steps take considerable time at each voting machine (mainly because of the time required to print multiple copies of the final report).	The manual should suggest closing multiple machines simultaneously by starting the reports running on one, then moving to another and starting the report there, etc. The final steps after printing the reports	Med

Problem/Issue	Recommendation	Priority
	should be performed by the EDT for consistency.	
21. Little auditing of vote totals is performed since Certificate #1 includes only optical scan ballots.	<p>Vote totals cannot be checked by precinct since voters can use any voting machine. However, polling place vote totals from signature books and the Audit Book could be compared against the final report.</p> <p>If there are discrepancies, they need to be found at the polling place where Judges can resolve and evaluate what went wrong. If this does not happen, BOE staff (who were not present) have to determine what action to take.</p>	Very High
22. Results were not posted at the precinct.	<p>Communicating results at the precinct (or polling place) is an important step to prevent mistakes or fraud.</p> <p>Copies of the final accumulated results should be posted at the precinct, given to the EDT, and Judges from each party in each precinct.</p>	Very High
23. Transmitting vote counts to the BOE may not be necessary, but if done should be more secure	<p>The focus should be on accuracy, not speed. Is it really necessary to setup an additional voting machine and download results over a phone line? This adds another point of vulnerability.</p> <p>If remote downloading is done, passwords should NEVER match the userid. This is the first guess of any hacker. The userid itself was reasonably easy to guess as well.</p> <p>The paper with the phone number, userid/password, and</p>	<p>High</p> <p>Very High</p> <p>Very</p>

Problem/Issue	Recommendation	Priority
	<p>instructions needs to unavailable to anyone other than the BOE employee doing the download. Someone with access to this information and basic knowledge of modems and file transfer protocols could probably modify the results of the downloading. Even if handled carefully, to download information from multiple drop-off locations (perhaps 50 or 100?) means that 50-100 people need the sensitive information. This multiplies the security risk and provides a strong argument against remote downloading.</p>	High

EDT Report/General Issues

Problem/Issue	Recommendation	Priority
<p>24. Seals on printer canisters do not seem to be real protection. Are they checked? If wrong, would BOE assume the poll worker made a mistake? Or what action would BOE take?</p>	<p>Seal numbers should be checked on canisters at the BOE. If seal numbers do not match the security event log, the canister results should be compared against the vote totals for the machine.</p>	Low
<p>25. BOE procedures for finalizing the election counts (e.g., accepting memory cards, checking certificate numbers) should be published.</p>	<p>Much significant work is done after results are sent from the polling place. These procedures need to be documented, available for review, and provided to Judges and the EDT.</p> <p>Witnesses should be allowed to be involved when these activities are performed. These procedures need to cover</p> <ul style="list-style-type: none"> • If a memory card was lost or stolen, how would this be detected? • If a memory card was lost or 	High

Problem/Issue	Recommendation	Priority
	stolen, what would be done?	
26. The voting process seemed to be heavily dependent on the EDT. Some EDT's that I met had little technical experience (one rarely used computers).	EDT's should perform the basic opening/closing steps in a training situation before working on Election Day.	Med

Summary of Cuyahoga County Voting Procedures

For readers who are not familiar with the process used for the May 2, 2006 primary election in Cuyahoga county, here is a brief summary.

- Cuyahoga county uses Diebold Accuvote TSX voting machines
- Optical scan ballots are used for curbside and absentee voters.
- Each precinct has four Judges including one Presiding Judge
- Each polling place (with one or more precincts) has one or two EDT's
- Judges and the EDT are provided with the "Booth Official Training Manual" and the "Election Day Technician Training Manual"

Monday

- Voting machines are delivered to polling places on Monday
- Judges and the EDT(s) meeting Monday night to check supplies, decide where voting machines should be located, unpack the machines, and attach printer canisters. The machines are not powered up and memory cards are not installed on Monday night.

Tuesday Setup

- Judges and the EDT(s) arrive at 5:30 Tuesday morning and prepare to open the polling place for voting at 6:30.
- Voting machines are powered up, memory cards are inserted, the Zero Totals Report is run.
- Judges sign the report, the paper is fed into the printer canister, and the canister is closed with a tamper proof seal.

Tuesday Voting

- Voters are directed to their precinct table. After verifying the voter is registered in the precinct, a Judge encodes a voter access card and issues the card to the voter.
- The voter will normally use a voting machine for their precinct, but if those machines are busy, the voter can use any machine in the polling place. The voter inserts the card into the voting machine and then is allowed to vote.
- When the voter is done voting, their selections are displayed in a small window on the printer canister. When all selections have been shown the voter can reject the ballot and make changes to their ballot or accept the ballot. The voter's choices and whether he or she accepted or rejected the ballot are printed and fed into the sealed canister.

- When done voting, the voter access card is ejected and the voter returns it to their precinct. The card cannot be reused until it is encoded for another voter.
- Provisional voters are given a voter access card that has a number encoded that connects the voter to his or her specific choices. When the BOE checks the provisional voter's information, the vote is removed if the voter was not properly registered.

Tuesday Closing

- Voting ends after all voters in line at 7:30 PM have voted.
- Two copies of the final reports are printed for each voting machine and signed by each judge. One copy goes into the sealed printer canister. The second copy goes into the Memory Card bag.
- Machines are shutdown and memory cards removed and cataloged.
- Each memory card is inserted into the "Zero Unit" and totals for the entire polling place are accumulated onto the "Zero Memory Card".
- One copy of results for the polling place including totals for all races and issues is printed and wrapped around the "Zero Memory Card" which is stored in the Clear Memory Card bag. These results for the polling place is not displayed at the polling place.
- Precinct supply bags are driven to intermediate gathering place where vote totals for multiple (perhaps a dozen) precincts are loaded into a voting machine and downloaded via modem to a BOE computer.