

# Collection of my Electronic Voting Experiences on the Sequoia Edge II

By: Noel H. Runyan

## March 2004 Election

(Taken from a letter to Dawn Wilcox, then president of the Silicon Valley Council of the Blind (SVCB), in response to her request for the blind community's voting experiences.)

I did have a problem trying to vote on the touch screen Sequoia systems. Although the folks that ran the polling place, at Hazelwood Elementary School, were very pleasant and helpful, the accessibility feature would not work. They tried plugging the key pad unit into more than one of the systems and called the tech support desk for help. The "support desk" just asked if they had checked to make sure the cable was plugged in and then said to give up and have someone assist me in voting. Since the keypads were not connected with USB cables, I suspect that the systems were supposed to be turned off, before the keypads were plugged in, and then rebooted. Our poll workers did not feel that they should reset or turn off the units. After I found the button, I was sorely tempted to just go ahead and force a reset myself. Judging by the shoddy design of the systems, I was worried that I might end up clobbering other voters' data.

They never did get the "accessible keypad" working while I was there. Therefore, I don't currently have much to say about the function of the access software.

There were a few other points I should mention. Originally they tried to plug the access keypad unit into a voting machine that was right under a very noisy ceiling fan. I think we need to make sure that poll workers are sensitive to environmental distractions, such as noise and sun glare.

Second, the keypad on the Sequoia machine had terrible braille labeling. Not only were the dots too shallow, they were about one and a half times further apart than standard dots. Thirdly, the labels were jammed so close to the top edge of some of the buttons that you could not feel the dots.

The keypad cable was looped back and restrained by a cheap cable tie. This looks and feels shoddy, like a flimsy afterthought (as I imagine it was). The wide Velcro restraining strap on the bottom of the keypad makes it awkward to hold in your hand and also makes it unstable to rest on a flat surface for operation.

I noticed several other general design problems. Some were as simple as the Velcro claw patches on the inside of the security panels, right at sleeve level, where they would grab the sweaters of voters. This might seem trivial, but not after a few units get accidentally jerked onto the floor. It should have been a simple design change to reverse the Velcro patches, to have the soft cloth patch portion exposed on the inside of the panels.

Another problem was the over all depth (front-to-back) of the units. Traditional polling booths and stands are not very deep. The Sequoia systems sprawled back so far that the poll workers had to get separate tables to hold the units. At our polling place, the tables were too big to fit in the areas where they previously put the voting booths. This meant that they had to use tables in the cafeteria/gym. When I arrived to vote, there were kids yelling and pounding on the piano, right next to the voting booths. Maybe these kids were just being creative about making sure the polling would not crowd into their lunch and play areas next time. Certainly, the sprawling design of these voting machines can be accommodated, but why should tax payers be wasting money on such poorly designed and inflexible voting machines.

I am particularly bothered that Sequoia seems to have ignored the suggestions that we and several others gave them, when we reviewed and tested their systems at PCBVI and the SVCB meetings, some time ago, when they were "seeking design input".

I am glad to hear that some visually impaired folks were able to vote successfully with some of the touch screen systems.

From hearing the stories of others, it is obvious that the touch screen, when in audio mode, should have a message to poll workers or assistants. This message should inform them that they shouldn't worry that the screen will not be reflecting any changes. Even my computer savvy wife was confused by the total lack of screen response to keypad button presses. The screen message could also give a brief summary of other helpful tips, such as where the volume control is located, how it works, etc.

Yes, the poll workers should be trained better, and the audio module should be set up at the start of the polling day and tested. However, appropriate help screens would help to augment the training of the poll workers or make up for their lack of training or poor memories.

Frankly, I think the Sequoia voting machines are so poorly designed and hard to access that the counties should not buy any more of this version. Also, the government should refuse to buy any more systems, unless they are completely redesigned and made reasonably useable. I don't think that the answer is to try to just train poll workers better! Clearly, Sequoia ignored our recommendations, when we were asked to evaluate their design in the past. I don't mean to sound negative, but I really don't expect Sequoia to change their design or their poor excuse for tech support, unless the local and countrywide governments refuse to buy their current product.

SVCB is in a unique position to influence accessible voting machines for the whole country. We have a responsibility to stand up now and demand truly accessible voting machines. If we don't, more of these farcical "accessible voting machines" will be pushed onto counties and visually impaired folks all across the country.

## **Voting Experience in November 2004 Election in Santa Clara County California - Using Sequoia Voting Machines**

My own voting experience started, at 7 in the morning, with a one hour wait in the cold, outside our Sunnyoaks fire station.

I had to keep my braille reading fingers in my pocket to make sure they would be warm enough for reading my braille notes. Even so, the polling place was so cold that my fingers were having a lot of trouble reading braille near the end of my time at the voting machine.

After signing in, and getting my voter smart card, I had to wait 8 minutes for them to reboot the audio voting machine. They had been using it for touch screen voting, as there was a very long line and just 5 voting machines for our combined 2-precinct site.

I had my braille notes in a hard-back notebook, so I could read my notes with the notebook on my lap. Thankfully someone found me a chair to sit on while voting. Otherwise, I would have had to tilt the display down flat and put my notes and keypad on top of the back side of the display. Since we were in very tight quarters, it was a good thing that the audio terminal was in a corner, at the end of the line of machines. This meant that I didn't have to worry about my chair blocking traffic in the very tight aisle.

I decided to use paper braille notes, rather than my talking laptop computer or a paperless braille notetaker, because I had heard that people would not be allowed to use computers and other electronic equipment in the polling place. For the next election, we need to address the issue of an exception for accessible note taking devices.

The volume control on the front of the key pad was not working well, and was resulting in scratchy and intermittent sound. By the time I got the volume set to where I could understand it, the introduction message had already finished the English instructions and was off into other languages. I was not sure what I should do, so I finally gave up and pressed the select button. This eventually got me to the language menu, where I was able to select English and get started with my ballot.

The first major problem I had was that the ballot on the machine was not in the same order as the printed sample ballot. When my wife pointed this out to the chief poll worker, she was surprised to see the difference, and said maybe that would explain why it was taking voters longer than expected to vote. Because my notes were done in the order of the sample ballot, I had to do a lot of hopping around in my notes and more thorough and careful listening to the machine.

In contrast to what we had been told, the list of candidate names was spoken in alphabetical order.

It took me 30 minutes to work my way through the ballot and make my selections. After that, I had quite a bit of trouble getting into the review mode, to get a full list of all my selections. When I did, it went on and on, for 23 minutes, like a long

uncontrolled drink from a firehouse. The review function read each item, and then, at the very end, said what my selection was for that item. It even threw in the details of what the fiscal impact would be, and took forever. This is completely backwards. It should announce the name of the item, then state my selection, and then read the rest of the information for that item. Also, I should have the control to press the arrow key to move forward or backward through the items, without having to listen to all the text about an item. When I did find that I had made a mistake in my selections, I had to wait until the end of the whole review process to correct it, instead of being able to stop, make the change, and then continue with the review where I left off.

I did not want to abort the ballot verification review, to make a correction, and then have to start the 23 minute review all over again. When I later attempted to change one of my selections from "no" to "yes", the machine would not let me just select "yes", until I had first gone to the "no" entry and deselected it. This was very awkward and confusing. My wife said that she also had the problem when she was voting visually on her DRE machine.

At one point, as I was nearing the end of the ballot, I was dumped back into the language selection menu. I was being very careful to not push the "help" button, so I don't know why this language menu popped up. For a scary minute, I was afraid I had just lost my ballot and was having to start all over. I re-selected "English" and fortunately was returned to my previous location in the ballot.

An additional frustration was that the volume on some of the messages was so much lower than the rest of the messages that I had to fiddle with turning up the volume, repeating the message, and then turning the volume back down before proceeding. The volume on all the messages should be normalized to make them the same. This is easy to do and should be done for all messages.

From the time I signed in and got my voter smart card, it took 8 minutes to reboot the machine as an audio voting machine, 30 minutes to make my choices, 23 minutes to review and verify, and another 4 minutes to make a correction and record my vote. Not counting the hour waiting in line, it took me about 65 minutes to mark and record my ballot.

It would have taken even longer if I had been willing to wait, as prompted, until the end of each message to push the "select" button. The messages mislead some folks because they say something like, "...at the end of this message, you can press the ...". This implies that you are supposed to wait until the speech message finishes.

Because the polling place was extremely small, the voting machines were too close together and not positioned to optimize privacy. While my wife was standing around, waiting for me to finish voting, she noticed that she could easily glance around and eavesdrop on the screens and ballots of other voters in the area. She feels that, for privacy reasons, the poll workers really shouldn't have allowed her to hang around in the voting booth area, while waiting for me to finish my voting.

When I was finally done voting, I took a portable radio out of my pocket and turned it on, with its earphone in my ear. The Sequoia voting machine was broadcasting a lot of radio noise on the AM band. This RF noise emission represents a possible electronic eavesdropping threat to privacy. Also, I noted that none of the poll workers seemed to notice or ask what kind of electronic device I was using and for what purpose. The polling place seemed to be too lax about letting people use cell phones, palmtops, or other electronic equipment in the polling place. There should have been but were not any announcements (audible or visual) warning voters against using cell phones, cameras, palmtops, or other electronic devices in the polling place.

There were two times when I would like to have asked for help from the poll workers. One was during the confusion I encountered because of the difference between the printed sample ballot and the DRE ballot. The other time was near the end of my ballot marking, when I had a lot of trouble getting the review started and then was trying to find and change a mistake I found during the review. Unfortunately, because the poll workers would not be able to look at a visual display on my system, and didn't have any way to join me in listening to the audio output of the machine, I figured that I couldn't get much help from a poll worker (even though our head polling officer seemed very knowledgeable and helpful).

## **November 2005 Voting Experience on Sequoia Edge II**

As it was election day, I went over to the Campbell American Legion Hall yesterday afternoon, to vote on the Sequoia machines. It was mid afternoon, and there was no line. However, as the polling officers (who were actually very pleasant), didn't know how to reboot the DRE into audio mode, it took them about 18 minutes to get it started talking. Thankfully, my wife read their manual and figured out the audio boot up process for them. After the DRE finally started talking, it took me about 6 minutes to fill out the ballot, 7 minutes to review my vote, and another minute to push it into recording my ballot and finish. Total time in front of the machine, 32 minutes. Luckily it was only a short ballot with 8 easy choices.

At the end the Sequoia prompts with a menu that says something like "You are finished voting" and "Review your ballot choices". Instead of the "You are finished voting" message, which will cause some folks to walk away, it should prompt you with something more like "If you are done making your choices, press select...to record your vote."

It was very difficult to understand the locally recorded messages for the ballot choices, since they had used a reader who had a very thick foreign accent!

One good change for this election, the American Legion Hall was actually roomy enough that I had a nice corner machine, with walls beside and behind me, to block eavesdropping.

## **June 6, 2006 Voting Experience on the Sequoia Edge II**

The June 6, 2006 primary in Santa Clara County was my fourth opportunity to attempt to vote on the Sequoia Edge II electronic voting systems. For 12 minutes, the poll workers struggled with trying to get the system talking. By watching the screen for them, my wife was able to tell them it wasn't setting up correctly. The poll workers tried repeatedly to program the voter ID card properly, so it would cause my voting machine to come up talking. Fortunately, I remembered that at the last Voter Access Advisory Committee meeting, a member of the ROV staff told me that the Sequoia ID card encoder did not show a menu choice for the audio voting mode. Our poll workers did not know that just before the final step of encoding the ID card, they were supposed to issue a special menu command, to bring up a hidden menu for selecting audio access mode.

After I explained this procedure for properly using the card encoder, they were eventually convinced to try it and were finally able to make me an ID card that actually worked and brought the machine up in the audio voting mode.

What will happen for all the folks who were not told or did not remember enough to convincingly tell their poll workers how to encode their cards properly for audio access mode?

One of the plaintiffs in the California voter action, Bernice, had to wait, after getting her voter ID card encoded, for the person in front of her to finish voting on the audio access Sequoia machine. When it was her turn, the Sequoia DRE rejected her voter ID card, as it had exceeded the 30 minute time out limit. She had to have her card encoded several times more, before the poll workers could finally manage to get it properly set up to put the Sequoia voting machine in audio access mode.

After 12 minutes waiting for my Sequoia machine to be configured in audio mode, it took an additional 31 minutes for me to successfully navigate my way through the ballot marking procedure.

It then took 8 more minutes for it to play out the ballot review.

At this point, I decided that I needed to change one of my votes to a write-in and that procedure took another 7 minutes.

By the time the system printed the paper trail and then spit out my voter ID card, I had spent a total of 59 and a half minutes, nearly an hour, trying to vote privately.

There were several other problems I encountered while trying to vote on this Sequoia Edge II voting system.

The voter ID card slot was hard to find, as it was located so low on the front bottom of the Edge unit and lacked a good tactile guide bezel around its opening.

The locally recorded audio messages were distorted and had puffing from blowing on the microphone.

Although the assistant ROV told us (at the last Voter Access Advisory Committee meeting) that we would have the new tactile keypads for this election, the systems still had the old four button keypads.

At least three times, while I was voting, the Sequoia Edge II timed out and put me back in the language selection menu, where it required that I press the select key twice to exit the language menu and return to my previous position in the ballot.

The Veriprinter was hung on the side of the machine, so the privacy shield panels did not really adequately enclose the much wider combined area of the printer window and touch screen.

I've heard from other voters, that in some precincts of Santa Clara county, they were using the old cardboard privacy panels from the old punch card booths, in hopes that would be a better privacy shield than the flimsy little panels that normally are attached to the sides of the Sequoia Edge units.

Because of the excessive width of the combined printer and Edge touch screen unit, the printer would have to be disconnected and removed, before the main touch screen portion of the voting system could be placed in a wheelchair voter's lap. Also, a motor impaired friend who tried this found that he had to have a poll worker stand behind the Edge II touch screen unit and hold up the back end of the unit, to keep it from falling off his lap while he voted. The Sequoia Edge II is clearly not designed to work in the lap of someone in a wheelchair.

The legs of the Sequoia Edge II stand appeared to be only about 16 inches apart, too narrow for some wheelchairs.

When the system printed my vote on the VVPAT roll-to-roll printer, I asked my wife to take a look at it, to verify my vote for me. It turns out that, if I am using the audio access feature and have a multi page ballot, the printer prints out the whole ballot in one shot, and then clears it out of the viewing window, without any break to stop and permit me to have a sighted friend read the paper trail for me. When sighted folks are printing their ballot on the VVPAT, (without audio) it only prints a single printer page's worth at one time and then pauses for the user to press a button to make it print the next page, when the voter is ready.

Since the manufacturers of the Sequoia system know that blind voters will not be able to read and verify the paper trail themselves, the manufacturer incorrectly assumes that all audio voters want the whole ballot printed out without any pauses for viewing by anyone.

One of the Sequoia voting machines in our polling place was broken and taken out of service. Luckily it was not the audio access voting machine!

In summary, the setup of the Sequoia Edge in audio access mode is still too complicated for the average poll worker, marking and reviewing the ballot takes a very long time for the audio voter, the physical privacy shielding is even worse than it used to be, and audio voters do not have any way of verifying the paper audit trail privately or otherwise.

## **November 2006 Voting Experience on the Sequoia Edge II**

This was the fifth election in which I attempted to vote on a Sequoia Edge II. It took an hour and 17 minutes at the machine, not counting the time in line. This time the poll workers actually knew how to set up the audio mode properly. They told me

that they asked for special training on the audio setup in their poll worker training class, because they knew that "a blind engineer" (trouble maker?) was going to be trying to vote there again. This makes only two out of five times that the poll workers have been able to successfully set up the audio voting mode by themselves.

It took about 8 minutes for the system to load the audio mode, all without any audible beeps or status indicators until it was up. I've heard it took 15 minutes for some to load the audio.

There was no loud publicly audible sound to alert the poll workers that the machine was reloading or finished booting up. For security reasons, there ought to be loud public sounds at reboot and whenever a vote is cast.

This time the systems had the newer V5 keypad with rate and volume control buttons. I was disappointed to find that the navigation controls were just as bad as on the previous keypad. There is not an up and down arrow pair, just left and right arrow keys. Thus, the Select key must be used multi-modally...sometimes selecting candidate choices, and other times to navigate out of or into races. It isn't clear to the user exactly when the Select key is changing its mode either.

The speech quality actually seems to be worse than before. When switched to the higher speed, it does a chipmunk distortion, rather than using VSC compression to properly increase the speech rate.

The video screen is still blanked during audio mode and does not support simultaneous audio/video display.

There was a VVPAT with a privacy cover flap but no audio access for me.

The time out bug that bounces back into the language selection dialog was still there, as well as all the cognitive complexity and problems I found in the primary.

Because there is no place to park the earphones and keypad when you are done and I also had my hands full with my braille notes, I put my voter ID card in my pocket as I was packing up. Consequently, I actually walked out the door with it still in my pocket and had to go back to turn in the card, which no poll worker had asked for to make sure that I didn't walk off with it. I wonder how many cards they lose.

An additional problem with the cards was that they timed out on my wife and others who were waiting for a turn at the voting machines. The 10 or 15 minute time out on the cards is much too short.

From what I've heard, it was taking most sighted folks who knew what they were doing 10 to 15 minutes to vote. So much for the claimed 300 voters per day capacity for these machines.

Notes:

A fabric flap with Velcro fasteners covered the printer on the left side of the booth.

The keypad braille dots were not as tall as they should be.

The keypad has a pair of buttons on top left for volume control and another pair on the top right for speech rate control.

There seemed to be only three speed settings and the faster speed did have chipmunk frequency distortion. The speed increase range was not enough to really speed up my vote casting time.

I had to remove the Velcro strap on the back of the keypad to be able to hold the keypad properly.

In addition to the volume and rate buttons, the keypad had buttons for Back, Next, Help, and Select.

There were no Up and Down navigation control keys, unlike what some people have claimed.

The prompts referred to the keys by color and shape, but did not reference them by position on the keypad.

The earphones for the audio were of extremely poor quality. Not only was the sound reproduction quality poor, the mechanical fit and adjustment range was terrible. I never could manage to get the headphones to fit for both of my ears at once.

When I asked our poll workers about sanitary covers for the headphones, they said that they were not supplied with any. A friend who was voting on Sequoia Edge II systems in Santa Cruz County said that they did have sanitary covers for their headphones. However, the covers they had were so smooth that the headphones kept slipping off her head. She said that she ended up with a pain in her neck, from holding her head at an angle that kept them from sliding off as much.

Because so many folks were crowded into the polling place while they waited, their conversations made for a lot of background noise that interfered with my trying to hear the audio messages. Next time I go to vote, I think I'm going to have to take along my own sound canceling headphones. That way I should have headphones that fit mechanically, have good sound production quality, and cut down on the background noise.

I found that the audio messages seemed to be more distorted and noisier this time, compared to the previous time I voted on the Sequoia Edge II. I even had my wife listen to the audio to confirm that the audio quality was poor.

An example of the system's poor message wording is :

"Press the round red Select button to exit this recording." The use of "exit recording" is quite poor from a human factors perspective, as the user doesn't think in terms of exiting anything they didn't physically enter and they are pretty sure that they aren't doing any recording.

## February 2008 Voting Experience on the Sequoia Edge II

If my own experience is any indication, the California Secretary of State's conditions for use are not being met and Sequoia voting systems are failing again.

The following are some notes about my February 5th Primary election experience in Santa Clara County, trying to vote on Sequoia Edge II DRE voting machines.

I arrived at the polling place sign-in desk at 2:27, and was told that the voting machine was broken.

Martin was the tech for the Sequoia Edge II voting machine. He said that the machine wouldn't start up when the polls opened, because the printer was low on paper. A field representative helped them to replace the printer, but they still couldn't get the system working. By 2:49, when I left, the machine had been dysfunctional all day and had not been fixed or replaced.

Upon my offer to help, Martin set the voting system back up, and I confirmed that the keypad and printer were plugged in properly. I noted that there was no cover cap or seal over the built-in RJ-47 plug that is sometimes mistakenly assumed to be the keypad cable plug.

When rebooted, the system came up and hung after displaying the message:

"Printing zero proof report. Please wait. February 5, 2008"

According to Martin, this is the same thing it had been doing all day. After waiting 10 minutes, we gave up on the system.

I also noticed that the system was not positioned properly to minimize exposure to potential eavesdroppers. Foot traffic was going in and out the door next to the voting machine, as well as behind me, when I was positioned at the front of the unit. When I mentioned this problem to the poll workers, they were surprised and seemed to have never heard that eavesdropping was a concern they should address by proper machine positioning.

Because of the failure of the Sequoia machine, the poll workers suggested that I might be able to go to some other polling place and vote provisionally, but they did not know whether the voting machines were working at the other polling places.

In the end, I was not able to vote privately and had to have someone mark my ballot for me.

It was 2:49 when I was finished voting and dropped my paper ballot in a flimsy cardboard ballot box. Apparently our polling place was making no attempt to provide overvote checking with precinct optical scanners.

I did try calling up the other polling place our poll workers recommended and was initially told that they did not have any voting machines in their polling place. When I persisted patiently and asked to speak with an actual polling official, eventually, a pleasant and helpful polling official named Terry came to the phone and said that their Sequoia voting machine had not been working, but that they had switched to a new card activator. She thought that their machine was then ready to vote on,

but said that it had not been tested by anyone actually trying to vote on it. They were apparently unaware of the Secretary of State's conditional certification requirement that at least five voters should vote on the Sequoia DRE before the close of the polls.

Unfortunately, this election marks the sixth opportunity I've had to vote on the Sequoia DRE voting machine in a real election and it was the fourth time the poll workers were not able to get the machines working, despite their being nice folks who were making a sincere effort to get the machines to function properly. I cannot fault the poll workers for the failures of these Sequoia voting systems.

This frequent and repeated failure of the Sequoia voting systems to provide accessible voting should be considered completely unacceptable!

This would seem to be a clear demonstration of the inequities that can come along with segregated ballot systems.

If any California counties are not going to cooperate and assure that the conditional certification requirements for their voting systems are met effectively, I hope the California Secretary of State will move rapidly to force those counties to acquire proper voting systems.

### **June 3, 2008**

I just finished my 7th attempt to vote on Sequoia Edge II voting machines in actual elections in Santa Clara County. Once again, the complexities of the voting system overwhelmed the pollworkers and they were not able to get the voting machine working by themselves.

I signed in at 2 o'clock in the afternoon, at our local firehouse polling place. It was disconcerting to hear the pollworkers literally shouting from one end of the sign-in tables to the other to ask and announce out loud what political party I was voting for. They were not being discrete at all about it and not even using a party code number, instead of the actual party name. They were also literally shouting, because there was someone using a noisy leaf blower just outside the large open doors of the firehouse. My party affiliation may be a matter of public record, but I do not feel it is right for the pollworkers to be telling all my neighbors and others in the polling place what party I'm voting for. I understand that other counties are more discrete and use a quietly exchanged code number to communicate the party affiliation between pollworkers.

When I asked to use the accessible voting machine, they told me that I would have to wait 20 minutes while they booted the system. They had actually set up the machine before poll opening, but had not left it turned on. Also, they admitted that the system had not been tested to make sure that the audio access was working.

The machine was set up a few steps away from the sign-in line and facing the line of people waiting to sign-in. When I mentioned the eavesdropping privacy exposure problem, the pollworkers agreed to turn the machine around so it did not face the sign-in line.

After inserting my voter ID card in the Sequoia machine, there was a long wait while the machine powered up, and the pollworkers kept saying that it was doing what it was supposed to do.

Eventually my wife finished marking and casting her paper ballot, so she came over to the Sequoia machine and looked at the screen. Because of her past experience with the system she identified that it was offering the language selection menu on the visual display, a sign that the system was not in the audio mode. When we told the pollworkers about this, they said that we just had to wait for it to start talking. I explained that I had some experience encoding the voter ID cards and asked the pollworker who was nicely trying to help me if they had selected the audio option from the hidden menu on the card encoder. He assured me that they had done it correctly.

Because the machine was clearly not in audio voting mode, my wife went over to the worker who actually did the card encoding and asked him about the procedure he had used to encode the card. He was shocked to realize that he had completely forgotten about having to do the audio access selection step in the card encoding process for my card. He soon had a new card ready for me.

At this point there was a new problem; they didn't know how to get the Sequoia Edge machine to eject my first voter card. After pressing several buttons and checking their manuals, one of the pollworkers decided that he should just go ahead and submit my unvoted ballot, using the touch screen and display. Fortunately, my wife stopped him by pointing out that I wouldn't be allowed to vote two ballots.

Next the pollworker went behind the machine and started pushing buttons again. He said that he had "pressed the eject button" but it had no effect. By "eject" button, he meant the yellow reset button. When the pollworker went off to read the manuals some more, I suggested to my wife that the pollworker might not have been holding the reset button down long enough. At this point, my wife went to the back of the machine and pressed the reset button, keeping it down long enough that it finally worked, the system reset, and ejected my original voter card.

As I was about to insert my second voter card in the Sequoia Edge, another pollworker asked me for the card and took it away to try encoding the card again. He said that the card had probably timed out, as there is a timing system used to disable cards that are not used shortly after they are encoded by the pollworkers.

Finally, after inserting my third voter card and waiting for the system to reload with the audio interface, the system started talking and was ready for me to start voting, 13 minutes after I originally signed in.

As I began listening to the choices on the ballot, I was surprised to find that the quality of the local recordings was terrible, distorted and scratchy, with lots of popping and chopping. Although the factory-recorded vendor's messages did not have the problem, the locally recorded names of races and candidates were so noisy and amateurish that I stopped voting for a minute and a half to record samples of the poor quality audio recordings.

When I returned to voting, I had a brief panic, as the system said, "You are finished voting." My panic stopped as soon as I realized that I had pressed the Back arrow key on the keypad and caused the system to wrap around to the end menu that gives a choice between reviewing your ballot or casting it. Unfortunately, the "You are finished voting" message sounds like a final prompt, rather than a menu choice asking you if you are done and ready to cast your ballot.

I managed to get out of that end menu and back into the ballot selection process, only to have to stop because the weed blower was back just outside the door again and so loud that it was totally swamping out the audio in my headphones. It was so loud that most voters would not have even been able to think. I gave up and requested that the pollworkers ask the gardener to wait till later to do the weed blowing.

After a total of 28 minutes at the voting machine, I was finished making my vote choices and began the ballot review, an unpausable five minute read out of the whole ballot, fiscal impact statements and all.

From start to finish, it took me 34 minutes to vote what is, by California standards, a very short and simple ballot.

In contrast to our February Primary election, when we never managed to get the Sequoia Edge machine to work for my voting, this June election went better, as we did finally get the machine working. However, if my wife and I were not computer scientists with special insider knowledge and experience with Sequoia Edge voting machines, I once again wouldn't have been able to vote privately and independently.

Sadly, despite having six previous elections under its belt, this county's learning curve seems to be flat and the reliability of accessible voting in the polling place has not improved.

## **November 2, 2008 Voting Experience on the Sequoia Edge II**

### **An Early Voting Experience**

Because my wife and I were going to be busy as pollworkers on election day, we decided to vote early, on the Sunday before election day. I was looking forward to learning how voting was handled at our early voting sites.

Just as the polls opened at 9 AM, we were at the Santa Clara County early voting center located in the ROV offices in San Jose, California.

The procedures for handling the waiting voters seemed well organized and efficient. We were given a serially numbered strip of paper just after we entered the building. This allowed us to sit down and wait till our number was called, rather than having to spend the 45 minute wait standing up in a long line.

It took pollworkers about five minutes to get the Sequoia voting machine ready before I was given a voter card and directed to the single voting machine.

As I was sitting down at the voting machine, the pollworkers were having to explain to another voter who wanted to use the voting machine that she would have to vote on paper because "The voting machine was only for voters with disabilities." I felt a bit guilty about this, but I'm glad that she didn't have to stand around for 51 minutes waiting for me to complete voting the long audio ballot.

After 12 minutes of silently loading up the audio ballot without any audible beeps or other indicators to indicate status or life in the machine, it finally started talking. During that loading process, pollworkers kept coming over and checking the screen of the voting machine every 3 or 4 minutes to see why it wasn't talking yet.

The audio for the locally recorded messages was scratchy; its volume was too low and not normalized to match the volume of the fixed factory messages; and the reader for the local messages was difficult to understand, as she was not a native English speaker. (For example, she pronounced "Democrat" as "Dem-Ohhh-crat".

The room noise level was sometimes so high that I had to stop my voting and turn up the volume substantially and then back up in the ballot and play the previous messages again. Just a couple of steps away from the audio voting machine, voting officials were actually having to shout to be heard above the noise. In the adjacent booth, some unfortunate mother's baby was screaming away at full volume. On the other side of me, a voter and pollworker were having a noisy and heated argument about why the voter wasn't allowed to vote with a regular ballot. It was all quite distracting for anyone trying to think, much less hear and understand the audio output of the voting machine.

Apparently the audio keypad cable was not plugged in cleanly. This was evident because the audio occasionally made the loud, angry-squirrel chattering noise we noticed at random times during the California TTB access review testing. In the TTBR, we tracked the problem down to poor connections in the audio keypad cable connector.

This time, I eventually felt around behind the voting machine's screen and found the jack for the audio keypad, and I made sure that it was seated properly. The pollworkers were not paying enough attention to ask me what I was doing messing around at the back of the voting machine, right next to the infamous yellow reset button of the Sequoia Edge machines.

Similarly, the pollworkers were not (according to my wife) paying enough attention to have prevented me from accidentally or purposely walking out of the polling place without returning the voter access card to them.

Summary of my voting time periods:

55 minutes waiting to vote in the long and short queues;

12 minutes waiting for the voting machine to boot up in audio ballot mode;

22 minutes for my vote selection;

16 minutes for audio ballot review;

1 minute to print the VVPAT, record the electronic ballot, and eject the voter card.

My total time sitting at the voting machine "voting" was 51 minutes.

The 16 minute review is like a drink from a fire hose, with no pause/resume function. You just have to sit and listen to it read all the information, even the fiscal impact report for each of the propositions!

If there is a next time having to vote on the Sequoia Edge machine, I will completely skip the review mode. Instead, I'll go back and re-navigate the ballot selection process and try to skip through quicker to review that way (hopefully without accidentally flipping any of my choices).

As I was putting away the headphones and keypad after I finished voting, my wife turned in my voter card to the Assistant ROV. The AROV grinned broadly and told my wife, "There now, that wasn't so bad, was it?" Perhaps she meant it wasn't bad because the machine wasn't completely broken down, as I've had happen several times before.

Now my subsequent pollworker experience is a more disturbing story...

## **May 20, 2009 Voting Experience on the Sequoia Edge II**

This May's special election was the 8th opportunity I've had to try to vote on the Sequoia Edge II electronic voting machine in actual elections.

When my wife and I arrived at the polling place, in a local church, we were warmly greeted by very pleasant pollworkers with nice attitudes.

After signing in, I asked to vote on the electronic voting machine. As my wife watched the pollworkers set up my voter ID card on the card encoder, she felt that they were not doing it correctly, so I asked the pollworkers if they were encoding the card for audio output and they said that they did.

At 6:39 PM, I was given a comfortable chair and I sat down to insert my voter card in the voting machine. I noticed that the privacy on the machine was not very good, as the screen and my back were facing toward the other voters as they stood in line, signed in and turned in their ballots. Additionally, there was a large mirror on the wall next to the machine. Later, when I pointed this eavesdropping exposure out to the chief elections officer, she apologized and explained that the mirrored wall was the only one with an electrical outlet for plugging in the voting machine.

Given those restrictions, the machine should have at least been turned around to face in the opposite direction, with the screen and the voter's back away from people in line and at the sign in tables.

After about six minutes, my wife was finished marking her paper ballot, and she came over to see how I was doing with the electronic voting machine. I hadn't been able to get any speech output from the voting machine. By the time my wife came to check on my progress, I had already discovered that the awkward design of the case around the audio jack for the headphone plug had prevented the pollworkers from properly inserting the headphone plug all the way. I managed to

get the plug inserted properly, but still had no speech output from the voting machine.

Because of her experience with the messages that should have been displayed on the voting machine, my wife recognized that the voting machine was not even trying to load the audio ballot.

When we pointed this out to the pollworkers, they agreed that they may not have set up the voter card correctly on the card encoder and would have to make another card. However, they did not know how to get my first card out of the voting machine.

I thought it might have been interesting to see how long it would take for the pollworkers to figure out how to remove the card by themselves (if they could), but I've been through that process on so many of my other seven voting attempts and I decided to be as helpful as I could.

I explained that they should be able to get the card out by pressing the reset button on the back of the machine and then had to describe what color the button was and where it was located. One of the pollworkers said, "Okay, I pressed it.", but the voter card did not eject from the machine. I then explained that they had to hold the reset button in for a while, until it would take affect. The pollworker complained, "How are we expected to know that!"

The pollworker then patiently kept the reset button in and held her breath until the Sequoia machine reluctantly ejected the card.

At 6:47, several of the pollworkers started trying to encode another voter card for me. After I explained that they had to bring up the hidden menu for selecting audio ballot mode, the pollworkers were able to get the card encoded correctly.

In this same election, another blind friend who lives in Santa Clara County had a similar problem with his pollworkers not knowing how to properly encode the voter card with the audio ballot enabled. As this blind friend also sits with me on our county's Voter Access Advisory Committee, we've discussed this voter card encoding issue several times before, and he was able to coach his pollworkers through the proper procedure to finally get his voter card set up for an audio ballot. From the stories we've heard from other voters over the last several years, as well as from our own experiences, I would estimate that failure of the voting machines to work properly for audio ballot voting is usually due to this annoying card encoder design flaw in the Sequoia system that makes it so difficult for pollworkers to get the machines properly set up in audio ballot mode.

At 6:50, I finally had a properly encoded voter card, inserted it in the voting machine, and eventually began voting. There were only six Yes/No propositions, so it only took until 6:58 to make my vote selections.

In previous elections, I found that the ballot review procedure on the Sequoia Edge II machines was extremely tedious and awkward, as the machine insisted on reading all the races nonstop, with way too much information (even reading the detailed fiscal report for each proposition). There is no way to pause and continue

the review, and if I discovered a selection error during the review, I would have to wait until the review was through to correct the error.

This time, I decided to skip the Sequoia machine's regular review process. I reviewed my ballot by going back through the entire vote selection process, which allowed me to eventually hear my selections and make any changes I might need. When reviewing the ballot by going back through the vote selection procedure, there is the risk of accidentally deselecting a selection you had already made and intended to keep. In any case, this approach to review appeared to work somewhat better than listening to the ballot in the machine's regular review mode. It was still a fairly tedious and time consuming process, but a little less frustrating, as it made it easier to shut up the speech and make changes if I found any errors. My ballot "review" process took about seven minutes.

There have been times when I would have liked to check the machine's accuracy by letting my wife check over my ballot printout on the VVPAT printer, but the Sequoia machine makes the incorrect assumption that, if the voter is using the audio output or the keypad (instead of the touch screen), then the voter won't want to check the VVPAT printout. Therefore, it skips the process for reviewing the printout and allowing corrections and reprinting. This also means that voters who cannot use the machine's touch screen because of manual dexterity impairments are forced to use the machine as if they were also blind and are similarly not given the ability to review the printout and then make changes to their ballot.

At 7:05 the machine returned the voter card for me to turn back in to the pollworkers, and I was done voting.

The total time I spent at the machine, trying to vote, was 26 minutes, one of my shortest times I've ever had trying to vote on the Sequoia voting machine. Luckily this election had an extremely simple and short ballot!

Also, luckily, I had my very helpful computer scientist wife along to help the pollworkers get the voting machine working properly. Once again, if my wife and I hadn't had out of the ordinary experience with, and technical knowledge of how to get the Sequoia voting machine working properly, I don't believe that I would have been able to vote privately and independently this year.

I don't fault the pollworkers for the problems with the voting system, it is just clearly too complex and poorly designed for them to operate properly and reliably. The pollworkers were trying hard to be helpful and were very pleasant (even gave out little candy bars to every voter).

Our pollworkers had carefully followed procedures and managed to have the voting machine unpacked, set up, and powered up when I arrived at the polling place. In some other polling sites, the machines were not even set up when blind voters showed up to use them. In Santa Cruz, one of the pollworkers at the sign in table started out by telling a blind friend of mine that they had no voting machine. When my friend pointed out that they were required by law to have an accessible voting machine, one of the other pollworkers admitted that they did have an electronic voting machine, but it was not set up. After some encouragement, the

pollworkers agreed to set up the machine. My friend had to sit patiently while the pollworkers went through the whole process of slowly reading the manual, setting up the Sequoia Edge II machine, printing the initialization tapes, and getting it ready for audio voting. After that my friend was able to successfully vote on the machine. Clearly, her pollworkers had some attitude and training issues.

Why should voters with disabilities continue to be forced to vote on segregated ballot systems that are far too complicated for the pollworkers to operate and that make us vulnerable to disenfranchisement because of poor machine reliability and inadequate training and/or poor attitudes on the part of the pollworkers?

California needs to move aggressively toward a unified voting system that does not force voters with disabilities to continue to use conditionally certified voting machines that were shown, in the State's own Top-To-Bottom review testing to be unreliable and substantially not compliant with federal and state accessibility requirements.