Accessible Voting Technologies Review
Voting Systems in Current Use

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Disclaimer

Examples represent voting technology that has been or is being used. It does not necessarily represent current versions of hardware or software. It is merely a snapshot of the voter experience over time.

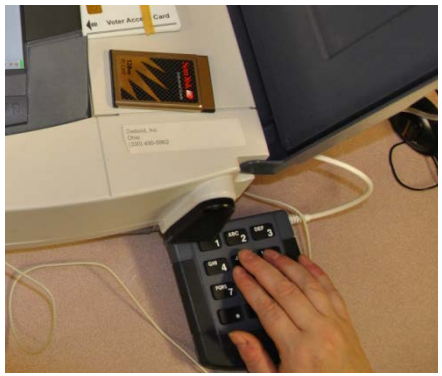
Controls on tactile keypads must be easy to identify, operate, and locate

Current voting systems often have keypads that make it easy to make mistakes.

Ambiguous layout

This numeric keypad is laid out like a phone, with the 1 at the top, but users might expect a computer layout, with the 1 at the bottom.

The keys are identified by number in the instructions

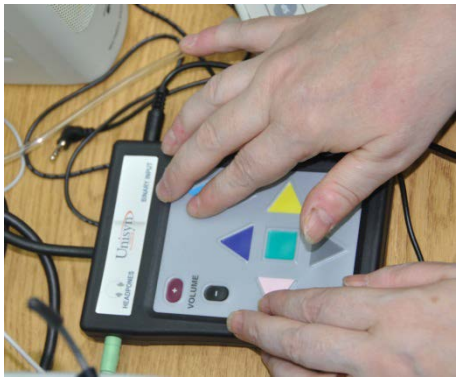


Hard to feel and identify

The low profile on these keys makes them hard to identify with limited tactile sensitivity.

They are hard enough to press to be a challenge for someone with limited dexterity

There is no Braille



Unintuitive key placement

The role of function keys on the 4 corners of this modified keyboard does not match the function of the keys on a normal keyboard.

The location of the keys on the keyboard is unusual, and requires moving your hands to find each key

Presenting an entire keyboard for write-in votes may be overwhelming to individuals who do not have typing skills or literacy.

VVSG requirements: 3.1.6 d. (minimize accidental activation); 3.2.2.1 e (differentiate by shape and color); 3.2.2.2 f. (tactilely discernable without activation); and g (status of locking keys discernable by touch); 3.2.3 b (no excessive force)

Controls on tactile keypads must be easy to identify, operate, and locate

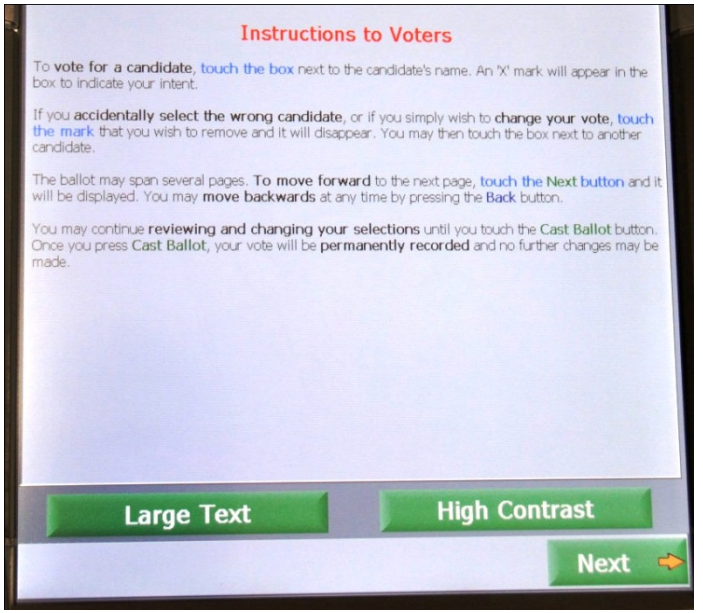
Solution:

An effective keypad must have:

- Two sets of directional keys with distinct functions:
  - one to select choices within a contest and
  - one to move between contests
- A dedicated select key, for unambiguous choices
- A high enough profile to be easy to identify
- Sharp Braille labels, identifying voting functions
- Keys for help, volume or other controls off to the side

Text and audio must match

Some systems have different text and audio.

Audio	Text on Screen	Image of Screen
Welcome to the visually impaired ballot system. Please be methodical and patient when using the audio ballot. You may increase the volume by pressing [[interruption: the instructions don't match]] or lower it by pressing the 1 key. If you wish to increase the playback speed, press the pound key at any time. Press the star key to decrease the playback speed. At each step the system will present a list of keypad options to cast votes and navigate the ballot. You may make your selection at any time. **Watch a video example**	To vote for a candidate, touch the box next to the candidate's name. An 'X' mark will appear in the box to indicate your intent. If you accidentally select then wrong candidate, or if you sip0ly wish to change your vote, touch the mark that you wish to remove and it will disappear. You may then touch the box next to another candidate. The ballot may span several pages. To move forward to the next page, touch the Next button and it will be displayed. You may move backwards at any time by pressing the Back Button.	

VVSG requirements: 3.1.4 a.; 3.2.1 a.; 3.2.2.1 f. requires equivalent visual and audio formats and audio synchronized to visual display; 3.2.8 Cognition.

Voters should receive clear instructions and be able to access help at any time.

Inconsistent use of terms

In the following example, the same ballot is called two different things:

"Welcome to the *visually impaired* ballot. Please be methodical and patient when using the *audio* ballot."

Complex or confusing information

Example 1:

"You have selected fewer than the number of candidates or choices that you are permitted to select for this contest, if you wish to return to this contest and select additional candidates or choices please press the left arrow key, if you wish to confirm your desire to undervote you can continue on to the next contest by pressing the right arrow key."

Example 2:

"Please use the up and down arrow buttons on the keypad until you reach your desired straight ticket party. You will be given the option not to select a party. Press the start button on screen or the square enter button on keypad to begin voting. Use the on screen left and right buttons to move from page to page within the ballot. You may use the right and left arrow buttons on keypad to move between contests. You may use the up and down buttons on keypad to move from candidate to candidate pausing when you have reached your desired choice"

Voters should be able to skip redundant or unnecessary instructions.

In this example, voters who use audio are required to verify instructions by identifying all keys before proceeding ("touch the triangle button") every time they vote.

VVSG requirements: 3.1.4; 3.2.8.

The VVSG 1.0 requires that voters be given clear instructions for all operations with mechanisms to get help at any time.

Voters should receive clear instructions and be able to access help at any time.

One possible solution:

- A dedicated key for help and instructions.

Voting systems should not time out quickly and when they do, they should alert the voter and ask if she or he needs more time or more assistance.

Some systems automatically start reading instructions again if a certain amount of time passes without a voter action. Continuously reading the instructions may be distracting rather than helpful.

Possible Solutions:

- Asking if the user needs help and then providing context sensitive help, including help about how to obtain assistance from a poll worker is generally useful.

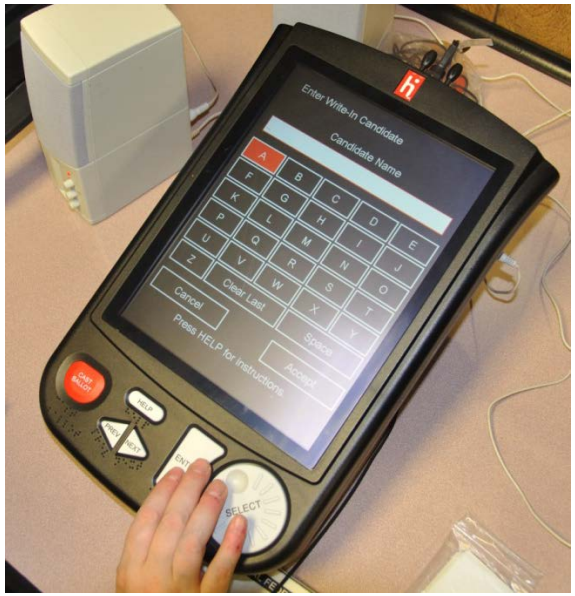
- If the voter responds that help is not needed, the system should continue to wait for a response.

VVSG requirements: 3.1.6 c. requires that systems alert the voter before timing out.

Flexibility in placement of components of a voting system helps people with motor and vision disabilities.

Voting machines that are full work stations may not be flexible to accommodate individual needs and may be cumbersome for poll workers.

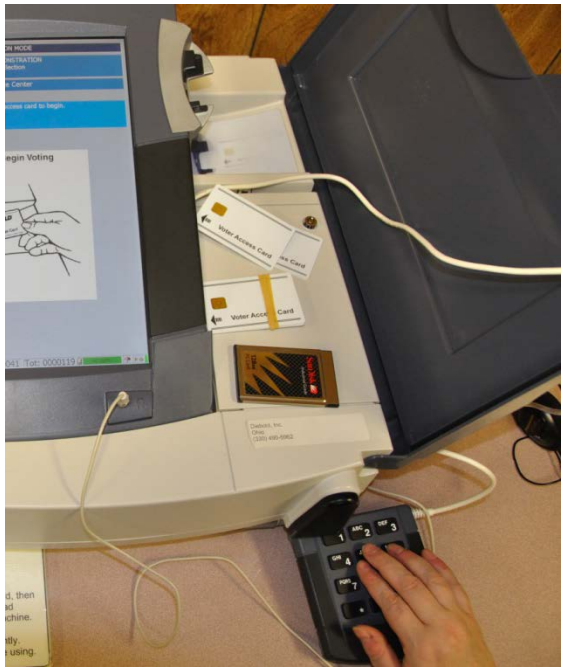
One piece unit may be difficult to position and move.



VVSG requirements: 3.2.4 Mobility

Flexibility in placement of components of a voting system helps people with motor and vision disabilities.

Voting machines that have flexible components can be easily positioned.



Individuals should not be required to use their own assistive technology.

Election officials are considering and experimenting with a wide range of solutions including PC's and tablets. Individuals are not required to provide their own assistive technology to use these systems, but often familiarity with assistive technology for PC's or for tablets is required to vote on them.

Example:

Some new systems use online ballot preparation. These systems require that users know how to use an Internet browser, assistive technology for PC's or tablets, and how to type.

Solution:

No solution on the market. But a solution might be a PC or tablet-based solution that has limited controls and limited purpose.

VVSG requirements: 3.2.1 b. individuals are not required to use their own assistive technology.

Speech output should be appropriate for the user.

Speech output requirements for a blind person who uses a wide range of speech output products daily may be very different from that of an elderly person who has rarely or never used speech output, individuals for whom English is not the primary language; those who need both audio and written information in order to process it, or those who have difficulty hearing.

Some synthetic speech may be difficult to understand and lack flexibility for setting rate and pitch.	Human digitized speech can provide articulate, natural sound. Greater opportunity for correct pronunciation. However, there can be inconsistency of voice quality, background noise, and changing volume levels.
 **Audio Example**	 **Audio Example**

VVSG requirements: 3.2.2.2 b. and c; 3.2.5; 3.2.7; 3.2.8.

Alternative forms of input must provide the same level of control as standard forms.

The VVSG requires an equivalent non-manual form of input be provided. This means that users of non-manual input should be able to skip races, review selections etc. To date, the primary means of alternative non-manual input has been a dual switch or a sip and puff. In either case, current systems require the voter to review the ballot sequentially with no ability to skip forward and backward among races.

Dual Switch	Sip and Puff
	

VVSG requirements: 3.2.3