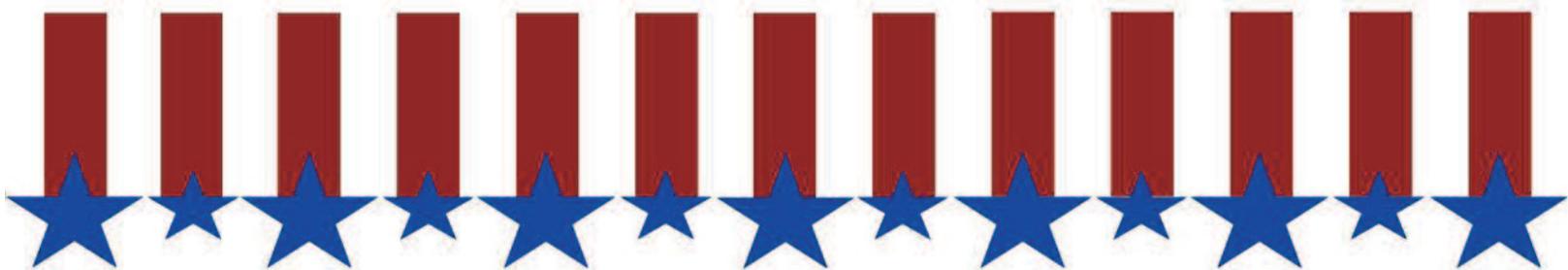# Guide to Disabilities and Voting System Access Features

Abstract

This Guide is designed to assist anyone interested in or working in elections better understand the functional limitations of individuals with disabilities, how those limitations can impact voting, and what access features are available in accessible voting systems to help provide private and independent voting for individuals with disabilities.

Table of Contents

"The vote is the most powerful instrument ever devised by man for breaking down injustice and destroying the terrible walls which imprison men because they are different from other men."

~Lyndon Baines Johnson~

Introduction

The Help America Vote Act (HAVA), signed into law by President Bush on October 29, 2002, was designed to improve the overall voting system in America. Included in HAVA was the seminal requirement for each polling place to have at least one "accessible voting system" to support individuals with disabilities ability to vote privately and independently.

Post HAVA, voting jurisdictions worked diligently to implement the requirement for one accessible voting system per polling place by purchasing a variety of commercially available accessible voting systems with different sets of access features. Now that these systems have been deployed for a number of years, it appears clear that simply placing an accessible voting system in a polling place does not necessarily lead to widespread understanding or use of the system and its access features.

Purpose

This guide was developed to provide a concise overview of the functional limitations associated with various disabilities and the different access features (those typically found in existing accessible voting systems) that address those limitations. It is hoped this information will be valuable to election officials, voting system manufacturers, disability advocates, and others who want to support the use of accessible voting systems by individuals with disabilities enabling them to vote privately and independently.

Understanding Disabilities and Functional Limitations

It is always helpful to begin by reminding readers that a person with a disability is not defined by the type or number of functional limitations they may have – he or she is a person first and foremost. Based on census data, it is estimated that about 20% of the voting population has a disability or functional limitations due to age. Since many disabilities are not visible, simply looking at a voter is not an effective way of identifying any specialized needs a voter might have due to disability. Even when a disability is visually evident, that does not mean it is the only functional limitation the person has nor does it automatically translate into the need for some kind of "help". Individuals with disabilities are unique and will use different access features depending on their distinct needs.

By definition (Americans with Disabilities Act and Section 504 of the Rehabilitation Act), an individual with a disability has a physical or mental impairment that substantially limits one or more major life activities. These disabilities may fall into broader, more familiar areas such as vision, hearing, motor, or intellectual/information processing. For reference purposes, Appendix A provides a broader list of medical diagnosis of disabilities grouped under these broader areas.

A limitation is defined as a lack of capacity in an area that restricts functionality. For example someone with a mobility limitation might be able to walk, but only for a limited distance without the aid of assistive technology such as a cane, walker, etc.; or he or she might be unable to walk at all and require a wheelchair for mobility. To further understand functional limitations frequently experienced by individuals with disabilities, see Appendix B. This table provides descriptions of the activities associated with different functional areas.

Disability Etiquette

By nature, many of us want to help someone in need. We recognize someone with a flat tire, someone who has dropped their groceries or someone who is reaching for something high on a shelf as situations in which we should offer help. In these situations, it is appropriate to politely ask the person if they need assistance -- and only provide assistance if it is desired. The same is true for assisting individuals with disabilities.

The following are some basic disability etiquette guidelines:

- Speak directly to a person with a disability – not to a companion, personal assistant, interpreter or other support person.
- Be considerate of the extra time it may take for a person who is disabled or elderly to get things done, and give unhurried attention to a person who has difficulty speaking.
- Do not lean on or touch a person's wheelchair, service animal or other assistive device without permission.
- Do not assume someone with a disability needs or wants assistance in voting. Always ask before helping and respect a person's decision to decline.
- Do not stand by in case he or she needs help later. While the gesture seems supportive it can make both of you uncomfortable. If the person has declined assistance there is no need to "hover". In voting, this is particularly problematic since it can violate privacy.
- Even if the person appears that they need help, **DO NOT** impose your perception on the situation. You may be taking away his/her independence or you may even endanger the individual. The individual is the expert in knowing if they need assistance or not.

If someone does request assistance, make sure you are trained and able to provide the support needed. For voting, assistance could mean general support in registering or getting to the voting booth. It could also mean specific assistance needed to help an individual with a disability use a specific access feature. Hopefully someone at each polling place has the expertise needed to provide specific assistance when needed.

There are additional resources available from disability organizations (such as the United Spinal Association). They offer a free disability etiquette booklet that provides basic information as well as disability specific ways to help. (www.unitedspinal.org/disability-etiquette)

Functional Limitations and Access Features

Ensuring an accessible voting experience requires physical access to the polling place along with programmatic access of the voting experience, including checking in at the polling place, generating a marked ballot, verifying that marked ballot and finally casting the marked ballot. This guide does not attempt to address the issue of architectural access of polling places, however, it is obvious how critical this access is to voters with disabilities. The Department of Justice provides a checklist to use to evaluate the architectural accessibility of polling places, see http://www.ada.gov/votingchecklist.htm. Voting jurisdictions may also reach out to local community organizations to conduct access surveys of their polling places.

This guide focuses on making the voting experience of marking, verifying and casting a ballot accessible. This can be done by using the access features of an accessible voting system and/or using personal assistive technology that the voter brings with them to the polling place. Of course some individuals will choose to have human assistance to vote which certainly should be respected if that is their preference.

The legal definition of "assistive technology" is any item, piece of equipment, or product system, whether acquired commercially, modified or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities. (Assistive Technology Act of 1998, as amended). Assistive technology can include mobility devices such as walkers and wheelchairs, hearing aids, glasses, electronic enlarging devices as well as hardware, software, and peripherals that assist people with disabilities in accessing computers or telephones. Those assistive technologies most comparable to the access features of a voting system are computer adaptations including screen enlargement software, text-to-speech (or screen reader) software, and alternative input devices (keypads, switches).

Table 1 provides a brief description of various functional limitations and identifies the types of access features that are frequently used to address those functional limitations. While each person with a disability is unique in their needs and requirements, this table is intended to provide a general framework for understanding the relationship between functional limitations and access features.

Vision Limitations - Blindness, Low Vision, Color Blindness

To be considered "legally blind" an individual has less than 20/200 vision in the better eye after correction, or less than a 20 degree field of view in the better eye after correction. Individuals who are blind may rely on screen reading software, with speech or Braille output to use a computer. They may have speech on their smart phones to allow them to select appropriate keys and navigate phone based keypads. For movies and graphics, they may rely on added verbal description (narrated speech description) to access the information content. Individuals who are blind may be unable to use a mouse and may require keys that can be "felt" to navigate through online or other electronic information. There are many types of low vision, including poor acuity, "tunnel vision", clouded vision, "floaters" in the eye, peripheral vision only, etc. People with low vision may need to enlarge fonts and images slightly or substantially using either electronic or manual magnifying. Electronic magnifying can be done via software on a computer or through stand-alone devices that take a picture or scan the text and then display it in an enlarged and/or enhanced version. Some individuals need to use specific combinations of text size and background colors, for example a 24-point yellow font on a black background, or to use specific fonts that are clearer for that individual to read. Individuals with only central vision (tunnel vision) or only peripheral vision can actually be harmed by text that is too big because they are unable to "fit" the text into their visual window. For these individuals, lighting and positioning of text is critically important. Color blindness is a lack of perceptual sensitivity to certain colors. This may result in a difficulty distinguishing between red and green, or between yellow and blue. Sometimes it may mean an inability to perceive any color. Individuals with color blindness may be unable to perceive color that is used as a unique marker to emphasize text or be unable to perceive text that inadequately contrasts with background color.	Typical access features found in accessible voting systems that may be used by individuals who have vision limitations include the following - • Contrast and color adjustments for screen display (different background and text colors and contrast levels) • Screen enlargement with large text size (typically equal to about 18 point font) • Synchronized speech output with visual display (can be enlarged text or regular size) • Braille or other tactile marking on keys (please note only a very small number of individuals with vision loss read Braille) • Color coded and different shaped keys to support easier visual recognition

Hearing Limitations - Deafness, Hard of Hearing, and Deaf/Blind

Deafness is typically considered to be a severe to profound loss of hearing which prohibits or significantly impacts use of hearing to receive and understand speech even when appropriately amplified. A person with a mild to moderate hearing impairment is usually considered hard of hearing. They typically can receive and understand some speech, especially with amplification, but still struggle with communication in noisy environments or when the listening situation is less than optimal.

Currently there is increased use of cochlear implants (a surgical treatment for hearing loss) along with more traditional hearing aids that are used to treat hearing losses of all kinds and degrees. Other assistive technology can also be used to ameliorate the impact of hearing loss such as assistive listening systems, telephone amplifiers, and visual alarms.

Captioning or transcription of audio information is another access feature that many individuals with hearing loss depend on to effectively watch television, participate in lectures, or follow other audio content.

Individuals who have both hearing and vision limitations frequently rely on amplified speech plus enlarged text. If their vision and hearing is severely limited, they may rely entirely on tactile communications, specifically hand-to-hand sign language for face-to-face situations and Braille for reading text.

Typical access features found in accessible voting systems that may be used by individuals who have a hearing or combination of hearing and vision limitations include the following –
- Visual cues for any auditory alert provided
- All of the access features identified for vision impairments
- Amplified audio output using the maximum volume control built into the voting system
- Amplified audio output using a neck loop or other personal amplification system coupled with the audio output of the voting system (headphone jack)

NOTES: Current voting systems do not have Braille output available as an access feature. Some jurisdictions have used hard copy Braille ballots with tactile marking guides to attempt to reach the deaf/blind population.

Motor and Dexterity Limitations

Paralysis involves partial or complete loss of muscular control and often sensation in part of the body. Paresis involves slight to extensive weakness in part of the body. Either condition may be accompanied by pain which can further impede movement. Individuals with paralysis or paresis may have difficulty with fine motor skills (limited hand and finger dexterity) and/or can have gross motor limitations (unable to stand, walk or control arm movements accurately). Individuals who have muscles that are tense and contracted or loose and flaccid can also have dexterity and gross motor limitations such as poor overall coordination or generalized involuntary movements. Any of these limitations can seriously impair a person's ability to accurately touch a small area on a voting system touch screen or accurately activate a key on a keypad. These limitations may also impact the pressure with which a person can touch or activate a control. These individuals may need keys to be activated with less pressure than most people or may be prone to using too much pressure that activates a repeat function on the key or selection spot. These individuals may frequently use adaptive key-boards with a layout of keys that matches their range of motion; they may use a head-mouse, mouth-stick or head-pointer, voice-recognition soft-ware, an eye-gaze system, or any one of a number of other assistive technologies to efficiently use a computer. They may need longer response times and adjustments in key repeat, requirements for simultaneous key use, etc. It is important to note that an individual's vocal chords can be affected by a motor disability resulting in difficult to understand speech. These individuals are not typically able to use even simple voice recognition systems, especially those based on a general "public" speech sample. These individuals will typically require an alternative to a voice-based user interface.	Typical access features found in accessible voting systems that may be used by individuals who have motor/dexterity limitations include the following – • Easy to activate keys, controls or other navigation features (These can be activated with a closed fist, an open hand, mouth-stick, hand gripped stylus, etc.) • Simple switch input devices (These devices are typically dual switch input that do not have auditory or visual scanning options – e.g. the voter may only be able to activate the A switch to go forward and the B switch to select which creates a very slow, laborious voting process) • Easily adjustable voting system position that provides control within reach and good visibility for voters who are seated while voting (e.g. a wheelchair user) • Voice recognition software is available on some prototype voting systems as an alternative input option

Intellectual and Neurological Limitations

Individuals with intellectual or neurological disabilities can have a wide variety of functional limitations that can impact voting. They may have difficulty processing written language when read visually, or processing spoken language when heard, or numbers when read visually or heard. There are some intellectual/neurological limitations that affect an individual's ability to focus or attend to a task. For some of these individuals, access to information in a redundant modality (audio in addition to visual, or text or visuals in addition to audio) can support comprehension. However, for those with focus or attending issues multimodal information can cause confusion and result in reduced comprehension. These individuals may have memory difficulties such as problems with short-term memory and/or long term memory and word finding challenges. In addition, these individuals may process information at significantly different rates that may vary depending on the information to be processed or the situation in which it is presented or other external influences. For some individuals, complex directions can derail them from undertaking a task that they are fully capable of completing. Using clear language that is not unnecessarily complex for the content, along with consistent instructions, is critically important to facilitate comprehension and support navigation through the voting process.	Typical access features found in accessible voting systems that may be used by individuals who have intellectual/neurological limitations include the following – • Contrast and color adjustments for screen display to improve discrimination • Screen enlargement to improve discrimination and comprehension • Synchronized speech output with visual display (should be voter adjustable to select visual only, audio only or both in synchrony to address unique individual needs) • Color coded and different shaped keys to support easier recognition • Easy to activate keys, controls or other navigation features (allows for intellectual focus on determining a selection not the motor task of activating) • Simple switch input devices (These devices could be extremely helpful in addressing intellectual/ neurological limitations with the addition of auditory or visual scanning options) • Easily movable system that provides the ability to adjust position and location to address individual needs • Voice recognition software is available on some prototype voting systems as an alternative input option

Access Features

Access features are those alternative input and output options provided as part of the accessible voting system. While each accessible voting system may have somewhat distinct access features, there is a common set of access features found in many if not most accessible voting systems. The information in Table 2 provides a basic description of these common access features. For specific information about the access features of a particular machine, the individual manufacturer user guide should be consulted.

It is important to remember that many access features are used by individuals with various types of disabilities and functional limitations. While no voter will use all of the access features of a voting system, a single voter may use a combination of access features to ensure they are able to vote privately and independently.

Examples of how the same access feature can be used by individuals with different needs include:
*   Speech output (including synchronized speech and visual display) can provide access to ballot content for voters with visual disabilities along with voters with dyslexia and intellectual disabilities that include reading/decoding limitations.
*   Tactile keypads (including those with keys of different color and size) can provide access to ballot navigation and marking for voters with visual disabilities; voters with motor and dexterity disabilities; and voters with intellectual disabilities that include visual discrimination limitations.
*   Enhanced screen display can provide access to ballot content for voters with visual disabilities along with voters with dyslexia and intellectual disabilities who have visual tracking and discrimination limitations.

Access Features

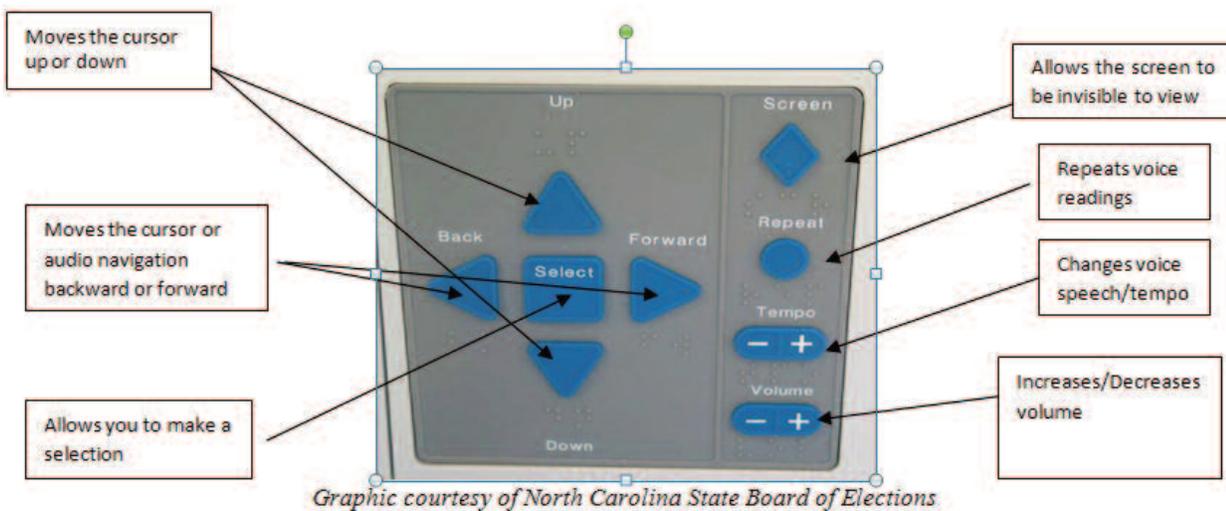| Enhanced visual display output	The visual display output on most accessible voting systems provides an option for the voter to change the text size displayed on the screen. The voter does not typically have unlimited zoom or enlarging capacity. Instead there is a standard text size display option and a large text size display option. The large text size is similar to 18 point font size in hard copy print text. Another enhanced visual display access feature that is usually available on an accessible voting system is the contrast adjustment. Similar to enlarging, voting systems do not typically have unlimited contrast adjustments. This feature allows a voter to change the contrast on the screen from a traditional look with black text on a white background screen to a higher contrast option with white text on a black screen. If this feature is available on your accessible voting machine it will be activated either by a key on the touch screen or as part of the tactile input.
Speech output	When speech output is active, a voice will read all the words on the screen. In most voting systems, when this feature is active the voter can adjust the speech to: • Repeat the words on the screen • Change the tempo or speed of the speech • Change the volume to increase or decrease the loudness of the speech Some voting systems also have features that allow the voter to skip, pause and otherwise control the speech output function. In some voting systems the screen goes black when speech output is active. In other systems a voter can choose to have the screen active along with the speech (see synchronized speech and visual display below.) In most voting systems, the speech can only be heard via headset or comparable output using a standard headset jack. Voters may choose to bring their own headset, neckloop or similar audio output device if it is compatible with the audio output jack.
Synchronized speech and visual display output	As described in speech output, when synchronized speech and visual display output are engaged a voice reads each word as it is displayed on the screen. Additional adjustments can usually be made by the voter to change the volume and tempo of the speech along with having the system repeat words as needed.
Tactile keypad input	A tactile keypad or similar tactile input is an access feature provided to be an alternative to touch screen input. In some systems the touch-screen is inactivated when you activate the tactile keypad while in others both can be active at the same time. A tactile keypad provides keys/controls that can be felt in contrast to a touchscreen which provides no mechanism to "feel" the difference between selections.

Access Features (*Con't*)

Switch input	Switch input as is currently available on some accessible voting systems consists of a dual switch (one that has two selection signals such as a sip and puff, two-sided plate switch, or rocker switch) and software that allows the switch to control navigation and marking of the ballot. Current voting systems do not include auditory or visual scanning software so the navigation is limited to a "forward/select" type of input option. As a result, the use of switch input is a rather time consuming way to interact with a ballot.
Touchscreen input	While technically not an access feature, a touchscreen is frequently the input mechanism used when a voter uses enhanced visual display or synchronized speech and visual display. The touchscreen on accessible voting systems typically responds to a light touch but does not necessarily have a large strike area. Some voters may be able to use this input with a stylus to assist in accurate "touch" selections.

Selected Access Features in Action

The following sections provide specific descriptions of access features of one voting system. While not all systems are the same, the features pictured below are representative of the access features on many accessible voting systems.

Speech output with tactile input

When speech output is active, a voice will read all the words on the screen. In general the voice is male and is the same one used in assistive technology (AT) products known as screen readers. Most accessible voting systems offer a method to repeat text, increase or decrease tempo, and adjust for volume. The picture below shows the tactile keypad used to navigate through and mark a ballot using speech output. Notice on this keypad there is Braille labeling. That may or may not be found on all systems. Also note that the keys on this machine are the same color. In some machines they will be a different color to support easier discrimination/identification. The keys on this system are different shapes, which is also done to support easier discrimination/identification. With many accessible voting systems, the tactile keypad input can be used as an alternative to the use of the touch screen (without using speech output).

Graphic courtesy of North Carolina State Board of Elections

Moves the cursor up or down

Moves the cursor or audio navigation backward or forward

Allows you to make a selection

Allows the screen to be invisible to view

Repeats voice readings

Changes voice speech/tempo

Increases/Decreases volume

The picture to the left shows a different tactile keypad layout on an accessible voting system. This keypad has only a forward/next key, a back key, and a select key (similar to a switch with three activations.) These buttons are different sizes and colors to support easy differentiation.

Yet another accessible voting system is pictured to the right and below with similar forward, back and select keys. The system to the right also has a "wheel" that moves the cursor through the ballot visually. This picture also shows two button switches and a "sip and puff" or pneumatic air switch that can be used to provide input.

Still another tactile keypad is pictured to the right with multiple keys of different shapes and colors.

In summary, the tactile keypads of accessible voting systems may look a bit different, but they all provide a mechanism for a voter to navigate and mark a ballot through the use of keys that can be identified by feel and frequently also by color and shape.
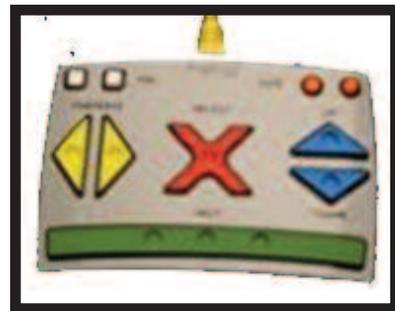
Enhanced visual display
Enhanced visual display typically allows the voter to do several things; increase the font size (Zoom In/Out in this sample) and adjust the contrast (change screen and text color in this sample). The voter can adjust these settings to best meet their needs through controls on the voting system. Those shown below are representative of how an enhancement feature is activated.

Graphic courtesy of North Carolina State Board of Elections

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Below is a sample of enhanced visual display on an accessible voting system. Both pictures show the enlarged text option activated and the second picture shows the enhanced contrast activated (changing the display to white text on a black background).
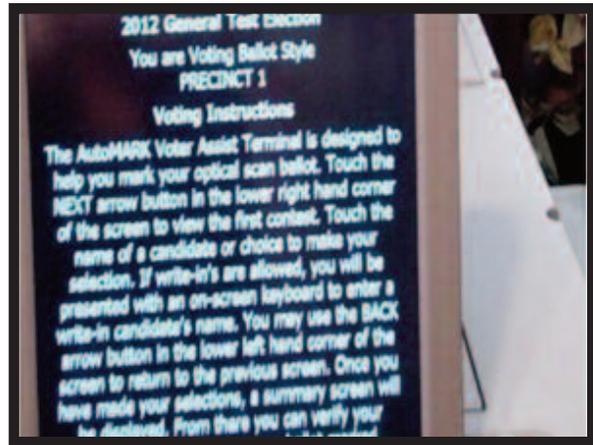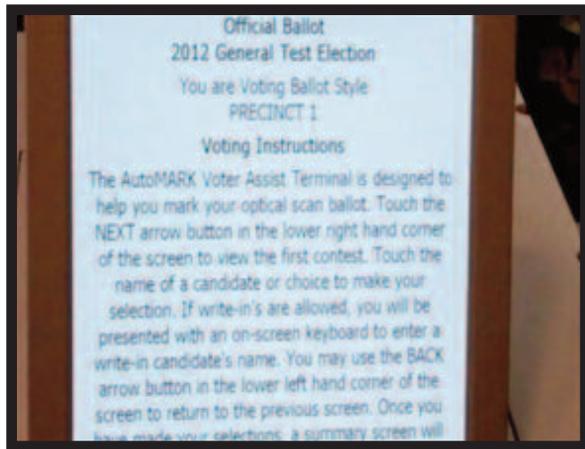

Switch input

Some accessible voting systems are equipped to allow for switch input devices (have jacks that allow different switches to be attached) in addition to having a headset audio output jack. For a switch to work with the accessible voting system, it must have software designed to support the switch (usually a modification of the audio-tactile ballot software).
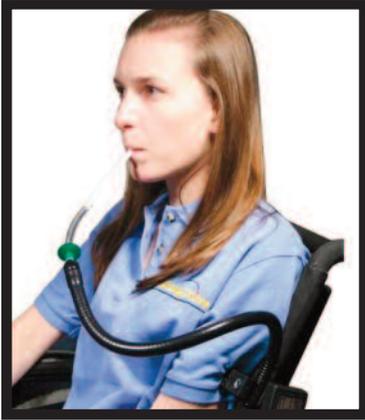

Accessible voting systems that do support switch input typically come with at least one dual switch. Almost all systems are set up to use a dual switch (A/B type input). Thus the types of switches that can be used include just about any dual switch such as:

Plate and rocker type switches
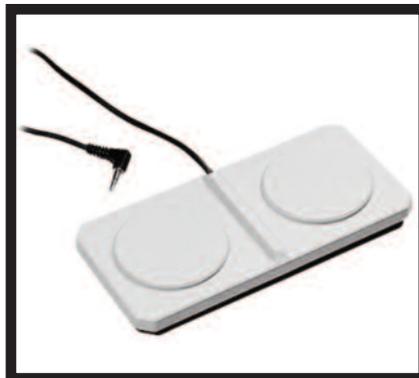
Pneumatic air ("sip and puff") and cheek switches

These are just a few of the examples of commonly used dual switches. Joysticks and many other devices commonly used by individuals with disabilities can be used as a dual switch so long as they can be attached to the accessible voting machine via the available jack.

Appendices

Appendix A - Disability Areas and Medical Diagnosis

Developmental Disabilities	• ADD/ADHD
	• Asperger Syndrome
	• Autism
	• Down Syndrome
	• Dyslexia
	• Dyscalculia
	• Fragile X Syndrome
	• Metabolic Disorders
	    Phenylketonuria
	    Hypothyroidism
	• Sensory-related Disabilities
	    Congenital Rubella Syndrome
	    Williams Syndrome
	• Degenerative Disorders
	• Rett Syndrome

Mental Disabilities	A
	• Alzheimer's Disease
	• Anxiety Disorder
	• Bipolar Disorder
	• Depression
	• Dyscalculia
	• Learning Disabilities
	• Memory Loss
	• Obsessive Compulsive Disorder (OCD)
	• Phobia Acrophobia
	    Agoraphobia
	    More in List of Phobias
	• Schizophrenia
	• Age-related cognitive decline
	• Agoraphobia
	• Amnestic disorder
	• Amphetamine dependence
	• Amphetamine withdrawal psychosis
	• Anterograde amnesia
	• Anxiolytic-related disorders
	• Asperger syndrome
	• Autism
	• Autophagia
	
	B
	• Barbiturate dependence
	• Benzodiazepine dependence
	• Benzodiazepine misuse
	• Benzodiazepine withdrawal
	• Bereavement

Appendix A - Disability Areas and Medical Diagnosis (*Con't*)

Mental Disabilities (*Con't*)	• Bipolar disorder • Borderline intellectual functioning • Borderline personality disorder C • Catatonic disorder • Catatonic schizophrenia • Childhood antisocial behavior • Circadian rhythm sleep disorder • Cognitive disorder • Communication disorder • Conduct disorder • Cotard delusion • Cyclothymia D • Delirium tremens • Depersonalization disorder • Derealization disorder • Desynchronosis • Dissociative identity disorder (multiple personality disorder) • Dysthymia E • EDNOS • Encopresis • Erotomania • Ekbom's Syndrome (Delusional Parasitosis) • Enuresis (not due to a general medical condition) • Exhibitionism F • Factitious disorder • Fregoli delusion • Fugue State G • Ganser syndrome (due to a mental disorder) • Generalized anxiety disorder H • Hallucinogen-related disorder • Hallucinogen persisting perception disorder • Histrionic personality disorder • Huntington's disease

Appendix A - Disability Areas and Medical Diagnosis (*Con't*)

Mental Disabilities (*Con't*)	I
	• Intermittent explosive disorder
	K
	• Kleptomania
	• Korsakoff's syndrome
	L
	• Lacunar amnesia
	M
	• Malingering
	• Manic episode
	• Medication-related disorder
	• Melancholia
	• Mental retardation
	• Minor depressive disorder
	• Mood episode
	• Morbid jealousy
	• Munchausen's syndrome
	• Munchausen's syndrome by proxy
	• Multiple personality disorder (Dissociative identity disorder)
	N
	• Neuroleptic-related disorder
	O
	• Obsessive-compulsive disorder (OCD)
	• Obsessive-compulsive personality disorder (OCPD)
	• Oneirophrenia
	• Opioid dependence
	• Opioid-related disorder
	• Oppositional defiant disorder (ODD)
	P
	• Pain disorder
	• Panic disorder
	• Paranoid personality disorder
	• Parasomnia
	• Parkinson's Disease
	• Persecutory delusion
	• Phencyclidine (or phencyclidine-like)-related disorder
	• Phobic disorder
	• Phonological disorder
	• Physical abuse
	• Pica

Appendix A - Disability Areas and Medical Diagnosis (*Con't*)

Mental Disabilities (*Con't*)	
	• Polysubstance-related disorder
	• Post-traumatic embitterment disorder (PTED)
	• Posttraumatic stress disorder (PTSD)
	• Premature ejaculation
	• Primary hypersomnia
	• Primary insomnia
	• Psychogenic amnesia
	• Psychological factor affecting medical condition
	• Psychotic disorder
	• Pyromania
	R
	• Reactive attachment disorder of infancy or early childhood
	• Reading disorder
	• Recurrent brief depression
	• Relational disorder
	• Residual schizophrenia
	• Retrograde amnesia
	• Rett's disorder
	• Rumination syndrome
	S
	• Schizoaffective disorder
	• Schizoid personality disorder
	• Schizophrenia
	• Schizophreniform disorder
	• Schizotypal personality disorder
	• Seasonal affective disorder
	• Sedative-, hypnotic-, or anxiolytic-related disorder
	• Selective mutism
	• Separation anxiety disorder
	• Severe mental retardation
	• Shared psychotic disorder
	• Social phobia
	• Somatization disorder
	• Somatoform disorder
	• Specific phobia
	• Stendhal syndrome
	• Stereotypic movement disorder
	• Stuttering
	T
	• Tardive dyskinesia
	• Transient global amnesia

Appendix A - Disability Areas and Medical Diagnosis (*Con't*)

Visual Impairment	• Blindness • Blurred Vision • Cataract • Color Blindness • Low Vision
Hearing Impairment	• Hearing Loss • Meniere's Disease • Tinnitus (Ringing In the Ears) • Conductive hearing loss • Sensorineural hearing loss • Mixed hearing loss • Auditory neuropathy
Mobility Impairment / Dexterity Impairment (Arms/Hands/ Fingers)	• Arthritis • Rheumatoid Arthritis (RA) • Osteoarthritis • Cerebral Palsy • Multiple Sclerosis (MS) • Muscular Dystrophy (MD) • Paralysis • Parkinson's Disease • Stroke • Hand tremors • Reduced co-ordination • Reduced Strength Arm/Hand • Repetitive Strain Injury (RSI) • Paraplegia • Polio • Quadriplegia • Hemiplegia
Head Injury	• Traumatic Brain Injury
Chronic Illnesses	• Chronic Fatigue Syndrome • Diabetes • Hypoglycemia • Renal Failure • Tuberculosis (TB)

Appendix B - Functional Limitations

Mobility and Dexterity

o Walking
o Climbing
o Balancing
o Stooping
o Kneeling
o Crawling
o Crouching
o Running
o Fingering
o Range of motion in extremities
  (i.e. flexion, extension, rotation, abduction,
  supination, and pronation)

o Motor coordination
o Eye/hand/foot coordination
o Wheelchair ambulation
o Transfer capabilities
o Grasping
o Handling
o Finger dexterity
o Manual dexterity
o Ability to operate hazardous equip-
  ment

Communication and Sensory

o Speech
o Hearing
o Visual acuity
o Visual fields (peripheral vision)
o Visual figure ground
o Visual motor integration
o Language (phonology, semantics, symbols)
o Tactile discrimination (i.e. surface textures and temperatures)

o Visual discrimination
o Auditory awareness
o Auditory discrimination
o Auditory figure ground
o Auditory blending
o Ability to use the telephone

Psychological Adjustment

o Dependability
o Conformance to rules
o Decision making/judgment
o Distractibility (tolerance to distractions)
o Interpersonal social skills
o Appropriate and meaningful leisure skills
o Ability to adapt to frequent changes
o Motivation/initiative
o Ability to follow instructions
o Self confidence/self image
o Preoccupation to illness or limitations
o Ability to obtain appropriate sleep
o Poor eye contact

o Dependency on others
o Task attendance
o Impulse control
o Appropriate mood (affect)
o Ability to assume responsibility
o Ability to accept criticism
o Concentration
o Anxiety/tension control
o Sobriety
o Respect for people/property
o Vulnerability
o Tolerance to frustration

Activities of Daily Living

o Eating/dressing
o Hygiene/grooming
o Control of bowel and bladder
o Utilization of public transportation
o Independence (relating to activities requiring assistance)
o Cosmetic appearance (including dental conditions)

o Food preparation
o Driving a vehicle
o Wheelchair transfers
o Ability to handle finances
o Utilization of community resources

Cognitive Functioning

o General intellectual functioning
o Abstract thinking
o Reading
o Writing
o Form perception
o Spatial perception
o Reading comprehension
o Spelling
o Math
o Auditory memory
o Auditory sequential memory
o Visual memory
o Visual sequential memory

o Problem solving
o Short term memory
o Long term memory
o Ability to follow complex instructions
o Orientation to reality
o Judgment
o Concentration (attention span)
o Common logic
o Ability to operate complex machinery
o Calculations
o Synthesis thinking
o Associative thinking discrimination
o Reading recognition

Strength and Tolerance

o Lifting/carrying
o Pushing/pulling/pressing
o Physical stamina/endurance
o Fatigue
o Reaching

o Sitting, standing, or stooping
o Tolerance to frequent temperature changes
o Tolerance to wet/humid conditions
o Tolerance to dust/pollen/fumes
o Tolerance to loud noises/vibrations

Adapted from Functional Limitation Guide from Missouri Department of Elementary & Secondary Education, http://dese.mo.gov/vr/CSG/FunctLimitGuide.pdf.

Appendix C – Disability Organizations

Election officials frequently need to reach out to individuals in the disability community for assistance with accessible voting system issues. The following is a brief list of major disability organizations that have a state and local level presence in most areas of the country. These state/local organizations can be an invaluable resource for election officials.

State Assistive Technology Programs
Each state and territory has a federally supported State Assistive Technology (AT) Program. These programs provide a set of services that support access to and acquisition of assistive technology (devices such as wheelchairs, hearing aids, electronic magnifiers, computer adaptations, etc.). Specific services can include financial loans for purchase of AT, AT reuse programs, short-term AT device loan programs, AT device demonstration programs, along with training and information and assistance. Many of these programs have been involved in accessible voting activities. The following link provides contact information for each State AT Program:
http://ataporg.org/states_listing.html

Deaf-Blind Equipment Distribution Programs
The National Deaf-Blind Equipment Distribution Program (NDBEDP) is a federally funded initiative designed to ensure that every person with combined hearing and vision loss has access to modern telecommunication tools and the training necessary to use them, granting every individual the opportunity to interact with the world as an involved, contributing member of society. The program provides outreach, assessments, telecommunications technology and training free of charge to those who meet federal eligibility guidelines. The following link provides contact information for each state organization/agency certified as a state deaf-blind equipment distribution program:
http://www.icanconnect.org/state-partners

Developmental Disabilities Councils
Each state and most territories have a federally funded Council on Developmental Disabilities (DD). These Councils are to engage in advocacy, capacity building, and systemic change activities and contribute to a coordinated, consumer and family-centered, system of services that enable individuals with developmental disabilities to exercise self-determination, be independent, be productive and be integrated and included in all facets of community life. Council members are appointed by governors to represent and advocate for people with developmental disabilities and more than 60% must be people with developmental disabilities or family members. The following link provides contact information for each DD Council:
http://www.nacdd.org/about-nacdd/councils-on-developmental-disabilities.aspx

Independent Living Organizations
Each state has a federally supported Statewide Independent Living Council (SILC). The SILC and the state entity responsible for vocational rehabilitation services are partners in the joint development of the State Plan for Independent Living, with input from the statewide network of Centers for Independent Living (CILs). Centers for Independent Living (CILs) are private, nonprofit corporations that provide services to maximize the independence of individuals with disabilities and the accessibility of the communities they live in. Centers can be funded with federal, state, local and private dollars or a combination of all of these funding types. Federally funded CILs provide, among other things, the

core services of advocacy, independent living skills training, information and referral, and peer coun-seling. Many states that fund CILs require the same core services be provided. CILs provide services for individuals of all ages with all types of disabilities. The SILC in your state is usually a good resource for identifying and locating all the CILs in your state or community. Most will have links to the CILs home page on the SILC web page. Another resource is this federally supported listing: **http://www.ilru.org/html/publications/directory/index.html**

Protection and Advocacy Agencies
Each state and territory has a federally funded protection and advocacy agency that protects the rights of individuals with various disabilities. The National Disability Rights Network (NDRN) is the nonprofit membership organization for the federally mandated Protection and Advocacy (P&A) Systems and Client Assistance Programs (CAP). Collectively, the P&A/CAP network is the largest provider of legally based advocacy services to people with disabilities in the United States. To find the protection and advocacy and client assistance agency or agencies in your state go to the following link: **http://www.ndrn.org/en/ndrn-member-agencies.html**

Vision Disability Organizations
There are two major national organizations for the blind that have chapters in most if not all states across the US. National Federation of the Blind (NFB) was founded in 1940 and advocates for the civil rights and equality of blind Americans, and develops innovative education, technology, and train-ing programs to provide the blind and those who are losing vision with the tools they need to become independent and successful. The NFB has affiliates in all fifty states plus Washington, DC and Puerto Rico, and over seven hundred local chapters, see: **https://nfb.org/state-and-local-organizations**.

American Council of the Blind (ACB) was founded in 1961 but many of its state affiliates and local chapters have a history that can be traced back to the 1880s. Since its inception, ACB and its affili-ates have been at the forefront of the creation of policies that have shaped the opportunities that are now available to people with disabilities in our country. ACB has also collaborated with Vision Rehabil-itation Service providers to develop the principles and values that should be at the heart of providing adjustment and placement services to people who are blind: **http://www.acb.org/node/65**

American Foundation for the Blind (AFB) is a third major national organization that began in 1921. As a national nonprofit with offices in five US cities, the American Foundation for the Blind focuses on ex-panding possibilities for Americans living with any type or degree of vision loss through access and equality, and especially by promoting the use of new technologies: **http://www.afb.org/default.aspx**

Hearing Disability Organizations
The National Association of the Deaf (NAD) is a national civil rights organization of, by and for deaf and hard of hearing individuals in the United States. Established in 1880, the NAD was shaped by deaf leaders who believed in the right of the American deaf community to use sign language, to con-gregate on issues important to them, and to have its interests represented at the national level. These beliefs remain true to this day, with American Sign Language as a core value. Most states have a state organization that is an affiliated member of NAD, see: **http://www.nad.org/community/state-association-affiliates**

The Association of Late Deafened Adults (ALDA) is an international organization with members throughout the United States, Canada, Europe, Asia and Australia. ALDA strives to provide education. role models and support for late-deafened adults. ALDA also advocates on behalf of late-deafened adults in promoting public and private programs that support their needs, and encourages research into the various aspects of late-deafness. ALDA was the pioneering force behind computer assisted real-time captioning that many individuals with hearing loss now use for communication access: **http://www.alda.org/about-alda/**

The Hearing Loss Association of America (HLAA) is the national organization representing people with hearing loss (used to be known as Self Help for Hard of Hearing). HLAA provides assistance and resources for people with hearing loss and their families to learn how to adjust to living with hearing loss. HLAA is located in the Washington D.C. area with 14 state organizations and many local and regional chapters across the country see: **http://www.hearingloss.org/support_resources/find-local-hlaa-chapter** .

Other Disability Specific Organizations

National Multiple Sclerosis Society
The National Multiple Sclerosis (MS) Society is an organization designed to help each person address the challenges of living with MS through a 50-state network of chapters. The Society helps people affected by MS by funding cutting-edge research, driving change through advocacy, facilitating professional education, and providing programs and services that help people with MS and their families move their lives forward. The following link provides access to the state/local chapters: **http://www.nationalmssociety.org/find-a-chapter/index.aspx**

ALS Association
The ALS Association was established in 1985 as a national non-profit organization fighting Lou Gehrig's Disease. The Association focuses on global research, providing assistance for people with ALS through a nationwide network of chapters, coordinating multidisciplinary care through certified clinical care centers, and fostering government partnerships. The following link provides access to the state/local chapters: **http://www.alsa.org/community/chapters/**

Brain Injury Association of America
The Brain Injury Association of America (BIAA) was founded by individuals who wanted to improve the quality of life for their family members and patients who had sustained brain injuries. BIAA focuses on advancing brain injury prevention, research, treatment and education and to improve the quality of life for all people affected by brain injury. BIAA has a network of state affiliates, local chapters and support groups, see: **http://www.biausa.org/state-affiliates.htm**

United Cerebral Palsy
United Cerebral Palsy (UCP) was founded in1949 when parents of children with cerebral palsy came together, looking for help, answers and information. Today UCP and its nearly 100 affiliates have a mission to advance the independence, productivity and full citizenship of people with a spectrum of disabilities. The following link provides access to the UCP affiliates: **http://www.ucp.org/findaffiliate**

Easter Seals

Easter Seals provides services, education, outreach, and advocacy so that people living with autism and other disabilities can live, learn, work and play in our communities. Easter Seals has been helping individuals with disabilities and special needs, and their families for nearly 90 years. From child development centers to physical rehabilitation and job training for people with disabilities, Easter Seals offers a variety of services to help people with disabilities address life's challenges and achieve personal goals. The following link provides a connection to local Easter Seals affiliates: **http://www.easterseals.com/connect-locally/**

The Arc

The Arc is a national community-based organization advocating for and serving people with intellectual and developmental disabilities and their families. The Arc encompass all ages and all spectrums from autism, Down syndrome, Fragile X and various other developmental disabilities. With more than 140,000 members and more than 700 state and local chapters nationwide, the Arc works to ensure that people with intellectual and developmental disabilities and their families have the support they need to be members of the community.The following link provides a connection to local Arc chapters: **http://www.thearc.org/find-a-chapter**

Paralyzed Veterans of America (PVA)

Paralyzed Veterans of America is a national organization that provides service officers who help veterans secure benefits that have been denied and Paralyzed Veterans' vocational rehabilitation counselors who help veterans get back to work. PVA currently has 69 National Service Offices nationwide and 34 chapters across the country, see the link below to identify these locations: **http://www.pva.org/site/c.ajIRK9NJLcJ2E/b.6452325/k.A0ED/Chapters_and_NSOs.htm**

National Spinal Cord Injury Association (NSCIA)

National Spinal Cord Injury Association was founded in 1948 to improve the lives of all paralyzed Americans. Their current mission is to improve the quality of life of all people living with spinal cord injuries and disorders. NSCIA provides peer support and advocacy that empowers individuals to achieve their highest potential in all facets of life focusing on civil rights; government policy and legislation; disability travel; accessible building and universal design; publications; research and education; and wheelchair and assistive technology. The following link can be used to identify local chapters across the country: **http://www.spinalcord.org/about/nscia-chapters/**

Learning Disabilities Association of America (LDA)

Learning Disabilities Association of America (LDA) was founded in 1963 and has grown to serve tens of thousands of members with learning disabilities, their families and the professionals who work with them. Today, LDA is the largest non-profit volunteer organization advocating for individuals with learning disabilities and has over 200 state and local affiliates in 42 states and Puerto Rico. The membership, composed of individuals with learning disabilities, family members and concerned professionals, advocates for the almost three million students of school age with learning disabilities and for adults affected with learning disabilities. The following link provides state and local affiliate information: **http://www.ldanatl.org/state_chapters/index.asp**

National Down Syndrome Society (NDSS)
The National Down Syndrome Society (NDSS) advocates for the value, acceptance and inclusion of people with Down Syndrome. NDSS envisions a world in which all people with Down syndrome have the opportunity to enhance their quality of life, realize their life aspirations and become valued members of welcoming communities. The following links provide information on local NDSS affiliates:
http://www.ndss.org/Resources/Local-Support/
http://www.ndss.org/PageFiles/3123/Affiliate%20Database.pdf

Tourette Syndrome Association (TSA)
Founded in 1972, the national Tourette Syndrome Association is a national non-profit membership organization whose mission is to identify the cause of, find the cure for and control the effects of Tourette Syndrome. TSA offer resources and referrals to help people and their families cope with the problems that occur with Tourette Syndrome. TSA membership includes individuals, families, relatives, and medical and allied professionals working in the field. The following link provides chapter information: **http://tsa-usa.org/aabout_tsa/ausachapters.html**

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For more information about Research Alliance for Accessible Voting see
http://www.accessiblevoting.org/