Effective Designs for the Administration of Federal Elections

Section 5: Rolling DRE ballots

June 2007

# Rolling direct-recording electronic (DRE) ballot interface

This section has three parts: (1) planning process information; (2) an overview of the basic rolling DRE voting process, and (3) illustrations of core screen templates.

### **Planning**

The planning section on pages 5.4 and 5.5 outlines how to incorporate resources into your ballot development and production process; areas in which those resources may be of assistance; and when those activities should occur. It offers tips on possible challenges and opportunities.

### Voting process

This section describes the basic linear voting experience offered by our rolling DRE ballot. Core user activities in all DRE systems include voting, reviewing votes, casting votes, getting help, and adjusting screen settings.

### Design templates

Essential screen templates, designed in support of primary values for the DRE voting process (page 5.6) are outlined on pages 5.32–5.37.

### Voter audience

This section details interface solutions for voters able to interact with a standard rolling DRE touchscreen input. Solutions use text sizes stipulated in 2005 Voluntary Voter System Guidelines (VVSG). Ballot instructions, labels, and navigation are written in simple language to support comprehension by voters at a third-grade reading level.

Rolling DRE specifications are based on information design principles, primary research findings, and accessibility requirements cited in VVSG section 3.2.

Investigation into the design of hardware leading to fully accessible voting solutions is strongly encouraged but was not a part of this effort—the contractor did not work with vendors on this particular aspect.

Final materials have been informed by an iterative research process involving reviews of existing products and practices, usability evaluations with representative voters, and interviews with elections professionals, subject matter experts, and poll workers. Without collaboration with vendors, design recommendations do not address the critical relationship between interaction design and hardware that many people with disabilities rely upon to vote. The best practices in this section focus exclusively on screen interactions.

### Areas of further study

System solutions for alternative input/output variations (combining tactile, audio, and visual toolsets) and accessible prototypes for a Voter-Verified Paper Audit Trail (VVPAT) are recommended.

### Suggestions for best practices

The general election rolling DRE ballot prototypes shown on the following pages are based on VVSG, Americans with Disabilities Act (ADA) guidelines, research findings, and information design principles.

- Emphasize voter needs over administrative and vendor requirements. Ensure that
  default screen settings (type size, color use, contrast levels) are usable for the
  broadest range of voters as is reasonably possible.
- Process should be clear. Voters should always know where they are in the
  process. At the contest level, voters should know how to vote in a particular
  contest or question and know how many votes they have remaining in multiselection contests.
- Ensure that screen settings for language choices, text size, contrast, and audio support are readily available and easy to change.
- Use simple language for all content. Studies show that clear and concise writing
  is beneficial to voters of all literacy levels. Rewriting ballot instructions and voter
  information materials using simple language increases usability and, on the voter's
  behalf, accuracy.
- Use color functionally to emphasize important information, highlight processes, and support usability needs. However, the use of color cannot be the sole means of conveying information or making distinctions. Some other noncolor mode such as contrast, icon, text style, etc., must complement the color. This is a mandatory VVSG requirement to address color blindness.
- Ensure that voters can review their voting record and change their votes from any point in the ballot.
- Ensure that voters can easily compare their on-screen voting record with their printed record. Provide redundant confirmations before a ballot is cast.
- Use upper- and lowercase sans serif type, set at a minimum of 25 points, for all ballot content voters will read. Given a choice between adequate type size and reducing the need to scroll lengthy referenda text, ballots with larger type were found to be more usable, even if voters needed to scroll. Avoid setting text in a centered alignment. Avoid setting text in all capital letters. Minimize the number of fonts used.
- Consideration should be given to candidate name order being rotated from precinct to precinct, so that all candidates will be listed first in roughly an equal number of precincts.
- Use instructional icons only. Universally recognized icons such as arrows are acceptable and encouraged.

### **Research findings**

Detailed findings that support the DRE ballot design best practices are in section 7.

# Planning process

The planning table on the following page outlines additional resources and steps that can be taken to ensure that ballot content and design best address voter needs.

These recommendations are based on the best practices in Cook County, Illinois, and the pilot test preparations in Nebraska.

### **Planning goals**

These additional resources can help ensure that:

- Content is easily understood by voters, including those with low vision and literacy issues.
- The visual organization of the content supports ease of use and confidence in the process.
- Any necessary translations are accurate and sensitive to cultural differences in language and expression.

### Planning value by role/resource

- Simple-language expert ensures that instructions and other ballot content are
  written in the most effective manner to help all voters (not just low-literacy voters)
  understand and follow instructions, and feel confident that they have properly cast
  their ballots.
- Information designer organizes the ballot content—text, graphics, illustrations—in a manner that is clear, simple, and functional, and that supports and enhances the voter's comprehension of the content and voting process. (Note: The design field is very broad; it is important to work with a designer who has expertise in the organization and presentation of complex information.)
- Usability expert works with the information designer to develop review, testing, and revision processes that improve the ballot's overall effectiveness, accuracy, and usability.
- Translator ensures proper grammatical, syntactic, and structural character of the content, and appropriate use of local dialect variations. Accurate translations are vital for non-English-speaking voters, and online translations are often misleading, unclear, or simply wrong (for Spanish translations, see EAC document "Glossary of Key Election Terminology, English-Spanish, 2007").
- Cultural expert reviews translated material to ensure that the translations are accurate and culturally relevant, and that their visual presentation is appropriate.

Resources	Planning, design, and usability activities	Tips
1. Election Official	Use the current election to establish a baseline for future work. Get voter feedback before starting, not just afterward.	
	Establish an approval process/team. Determine who must sign off on improvements at each phase.	
2. Election Official	Choose an objective, professional resource to take ownership of information design challenges.	Whenever possible, hire a local person who will be able to meet with officials and the extended production team (vendors, printers, etc.).
	Simultaneously hire a designer and a usability professional who can offer additional feedback.	Provide the designer with poll worker training, as well as any feedback from voters or poll workers.
	Partner with a policy advisor who can help guide design improvements through the necessary legislative processes.	Provide the designer with a complete list of curren election documents and legal requirements.
3. Designer and Usability Expert	Review and become familiar with election design standards and recommendations.	
	Understand variance between EAC best practices and local requirements for poll worker and voter materials.	
4. Election Official	Estimate value of design improvements.	
	Gauge impact of the redesign process during the next election planning cycle.	
Resources during	election cycle	
Resources	Content development activities	Tips
Simple-Language Expert	Edit final English-language content for low-literacy voters.	
Translator	Translate content for non-English-speaking voters.	Understand the translator's requirements before the election: data formats, time line, etc.
		Have a third-party expert review the translated materials after the initial draft. Legal advisors may need to review the materials after simple language and design have been incorporated.
Alternative Language/ Cultural Expert	Review translated content in each alternative language for cultural relevancy.	Translation services may not be aware of possible cultural sensitivities of translated material.
Designer	Election official provides designer with final content for different materials, in English and other languages, after they have been reviewed by simple language and cultural experts.	

# Voting process

The rolling DRE interface design in this section supports intentional ballot completion by voters. Content, design, functionality, and navigation elements have each been developed to support this primary goal.

The interface design is based on VVSG statements on accessible type sizes for electronic displays. This default type size minimizes the screen setting steps required of low vision and it eliminates the need for many to adjust type size at all. This accessible type size allows language selection to be the first screen the voter sees. A voter can then receive all ballot content in their preferred language—without resorting to the "help" section or requesting help from a poll worker.

Depending on screen resolution and screen orientation, more candidates may be displayed than are shown in the examples. If there are more candidates than will fit on one screen, an alternative would be to reduce button size based on the following criteria:

VVSG minimum button height is 0.5 inches and the minimum distance between buttons is 0.1 inches. Using the accessible type size illustrated here, buttons could be reduced to .62 inches in height (the accessible type size will not comfortably fit in a button only 0.5 inches in height) and the distance between buttons could be decreased to 0.1 inches to allow more names to appear on the screen at one time.

### Key features of the voter's experience are as follows:

- Clear, simple instructions
- Completion indicators
- Persistent review/edit access prior to casting vote
- Undervoting notifications
- Easy to access help, instructions, and screen settings

The central rolling DRE flow (shown on the following pages) is organized in a linear voting sequence. This sequence first presents the core voting tasks and options, followed by optional or nonrequired paths (such as accessing voting help).

### Core tasks include:

- Selecting a language
- Voting
- Reviewing choices
- Casting the ballot

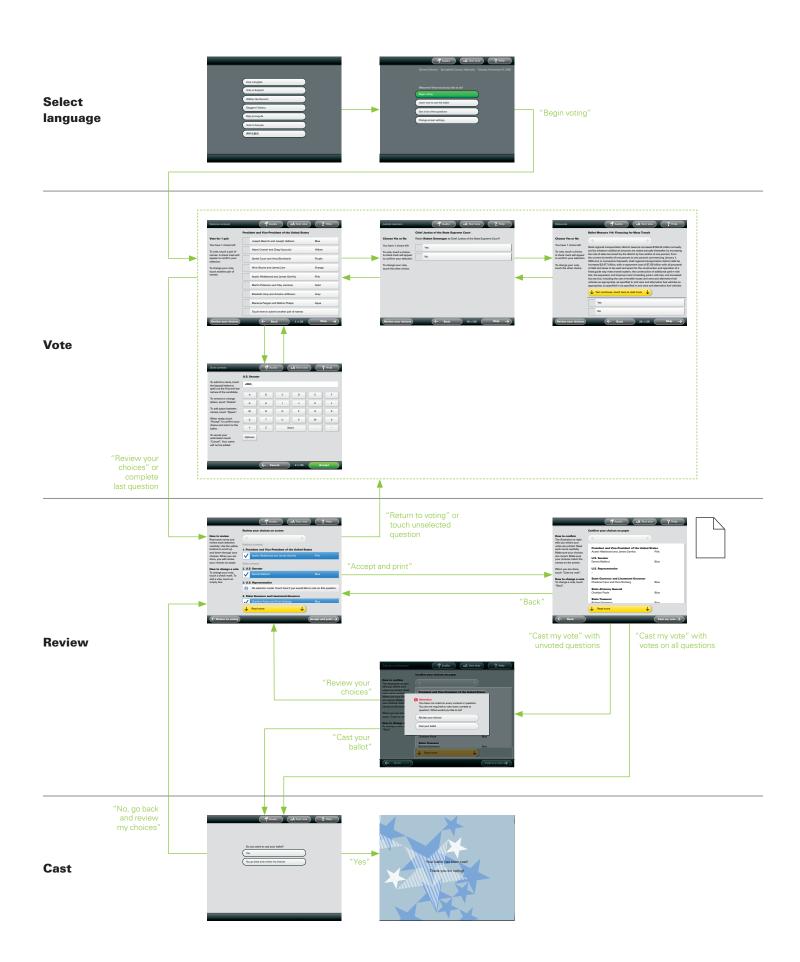
### **Optional tasks:**

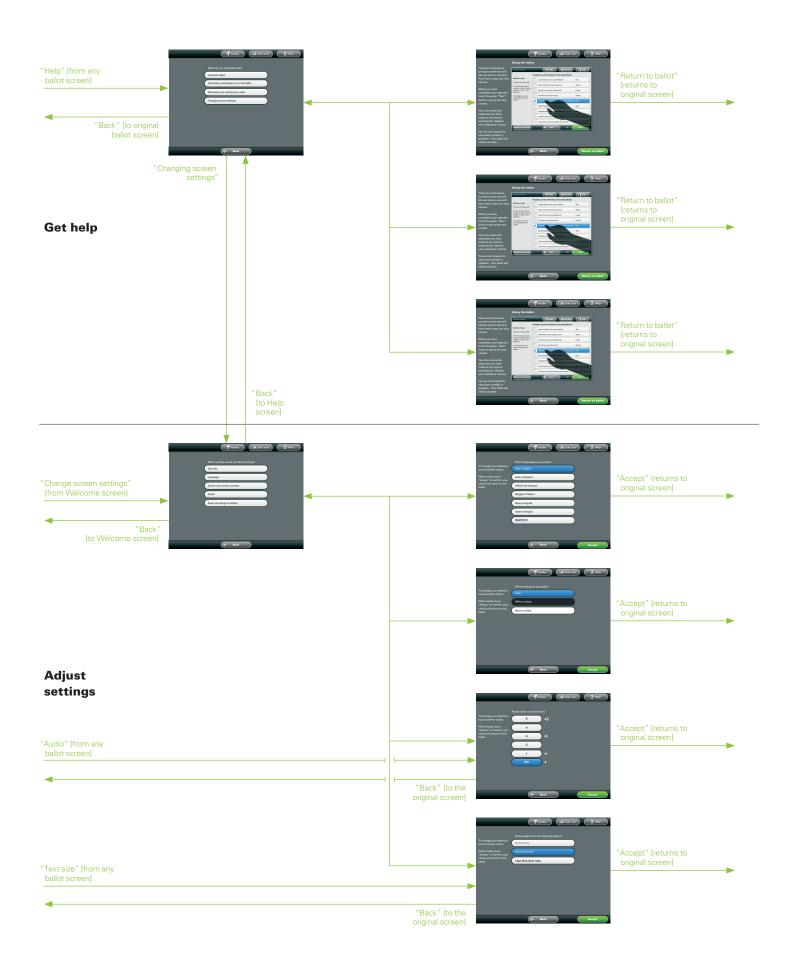
- Accessing help
- Adjusting settings

### **Experience flow**

The map on the next page presents an overview of the primary voting path and the navigational options that move users between task "sections." A map of the Help and adjustment screens, which are accessible from all points in the primary path, appears on the right-hand page.

A detailed walkthrough of the core path begins on page 5.9.





### Language selection, Welcome, and Voting



### Language selection screen

Before any voting takes place, voters are asked to choose their preferred language.

When the voter selects the language, the Welcome screen (below) appears in the chosen language.

The screen can accommodate up to nine language buttons

The voter can change the language through the "Help" button from any screen on the ballot.



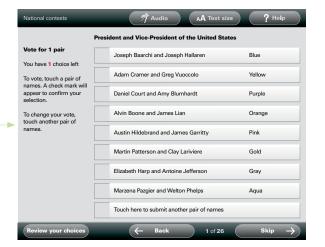
### Welcome screen

All content appears in the selected language.

The "Begin voting" button 1 takes the voter to the first contest screen (below).

Options to learn how to the use the ballot 2, to see a list of the ballot's contests and questions 3, and to change screen settings 4 are also offered.

Persistent Audio, Text size, and Help options are introduced in the top band.



### Contest screen

After the voter touches the "Begin voting" button (above), the first contest screen appears and the voter can begin voting.

### **Voting: single selection**

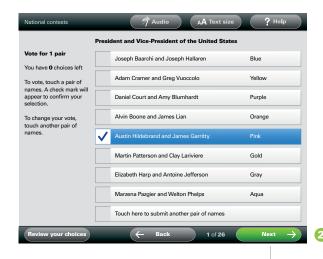


### Contest screen

A "voter counter" indicates the number of votes remaining. Instructions explain how to make a selection and how to change a selection.

The voter is given a large touch area.

If the voter chooses to skip a contest by touching the "Skip" button 1, the next contest screen will appear.



When the voter makes a selection, it is highlighted by a check mark, color change, and contrast change.

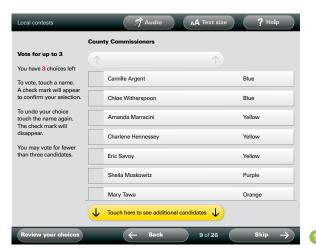
Vote counter changes to indicate "0" votes remaining.

The navigation button 2 changes from "Skip" to "Next," and the color changes to green.



After the voter touches the "Next" button, the next contest screen appears and the above sequence is repeated.

### **Voting: multiple selections**

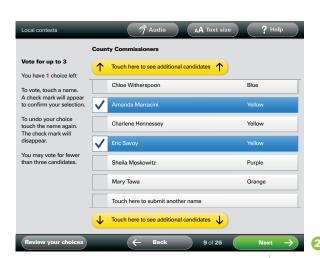


### Contest screen

A vote counter indicates the number of votes remaining.

If the voter chooses to skip a contest by touching the "Skip" button 1, the next contest screen will appear.

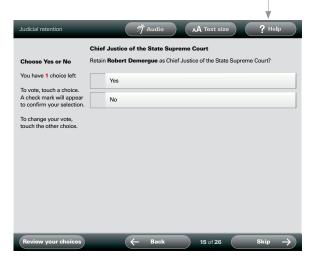
With lengthy lists of candidates, scrolling may be necessary. Color and shape are used to differentiate scroll buttons from candidate buttons.



Voter makes selection. Selection is highlighted via check mark, color change, and contrast change.

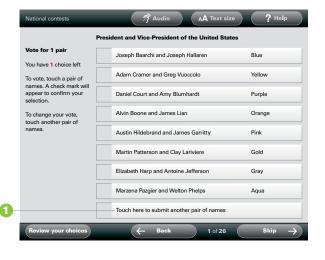
The vote counter changes to indicate the number of votes remaining.

The navigation button 2 changes from "Skip" to "Next," and the color changes to green.



After the voter touches the "Next" button, the next question screen appears and the above sequence is repeated.

### Voting: submitting names not on the ballot (write-in)



### Contest screen

The voter chooses to submit a candidate not listed on the ballot ("Write-in") and touches the button labeled "Touch here to submit another candidate" 1

The voter moves to the "Write-in" screen.



2

### Write-in screen

Instructions specify the keypad entry method.

The voter has the option to cancel 2 or accept 3 an entry.

Once the choice is accepted, the voter is returned to the contest screen. Touching either the "Cancel" or "Accept" navigation buttons returns the voter to the previous contest screen.

The A-B-C keypad format is the current standard among electronic voting machines.



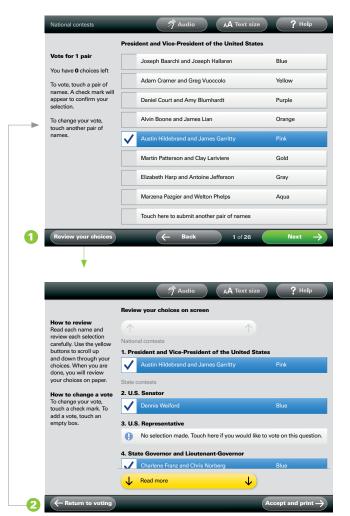
### Contest screen

The submitted name appears on the contest screen 4.

The voter may touch the "Next" button to move on to the next screen.

If the voter selects an existing name, the "Write-in" button will return to its original state and the new selection will be highlighted.

### Accessing the review screen



### Contest screen

From any point in the ballot the voter may access the review screen by touching the "Review your choices" button 1.

### Review screen

Touching the "Return to ballot" button 2 returns the voter to the previous contest or question.

The Review screen shows the updated list of votes upon each return.

### **Reviewing and revising choices**



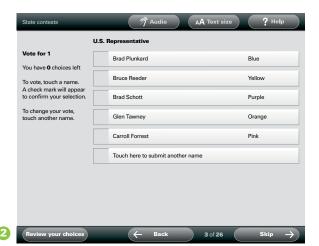
### Review screen

Voters use the scroll buttons to review their list of votes.

Any unvoted or undervoted contests or questions 1 are clearly indicated.

Touching a name again or touching a button that indicates an unvoted or undervoted contest or question takes the voter to that contest screen.

As shown here, the buttons that indicate a selection match the buttons the voter is familiar with from the voting screens.

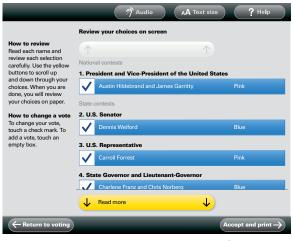


### Voting screen

At the voting screen the voter can make or revise a selection.

Touching the "Review your choices" button 2 returns voters to the review page—at the point in the list from which they left.

Alternatively, the voter can touch the "Next/Skip" button and move to the next contest screen.

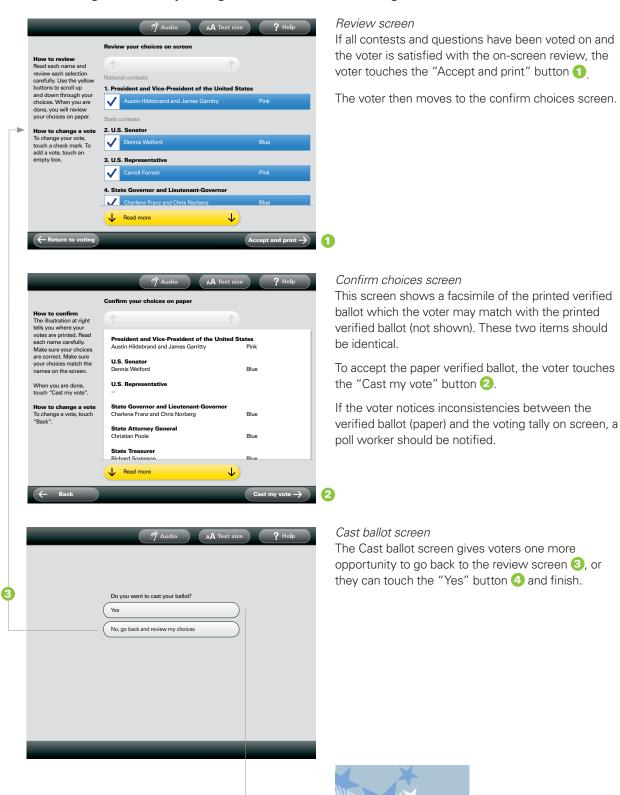


### Revised review screen

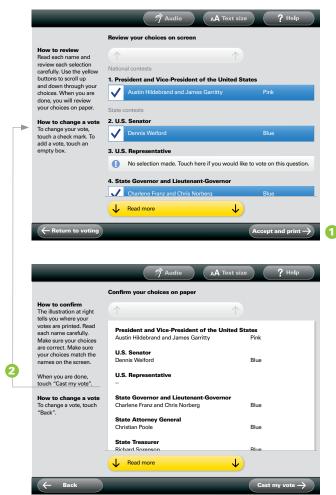
The new or revised selection is indicated on the updated review screen.

Voter can continue to review their choices or move on to printing their paper verified ballot.

### Confirming selections, printing verified ballot, and casting the ballot



### Confirming selections, printing verified ballot, and casting the ballot



### Review screen

If all contests and questions have **not** been voted but the voter is satisfied with the on-screen review, the voter can touch the "Accept and print" button 1

An alert will appear cautioning that the voter has undervoted.

### Undervote alert screen

This screen gives the voter two choices: either return to the review page and revise the ballot ② or cast the ballot (even though it is undervoted).

Voters who choose to continue will move to the Confirm screen.

# Review your choices on screen How to review Read each name and review each selection carefully. Use the yellow buttons to scroll up. Austin Hildebrand and James Garritty Austin Hildebrand and James Garritty Fink 1. President and Vice-President of the United States 1. President and Vice-President of the United States 2. Austin Hildebrand and James Garritty Fink State contests 2. U.S. Senator 3. U.S. Representative Carroll Forrest 4. State Governor and Lieutenant-Governor Charlene Franz and Chris Norberg Read more

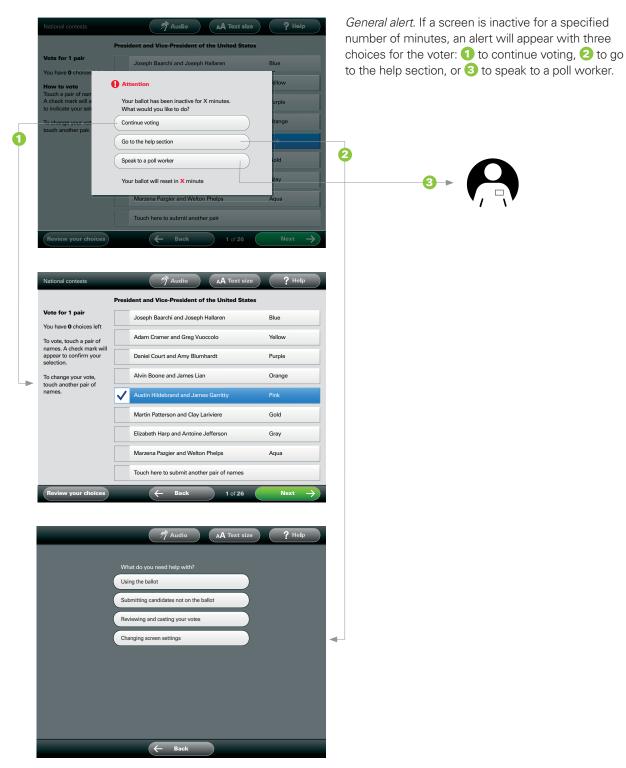
### Confirm choices screen

This screen contains an on-screen facsimile of the printed verified ballot which the voter may match with the printed verified ballot (not shown). These two items should be identical.

To accept the paper verified ballot, the voter touches the "Cast my vote" button 3



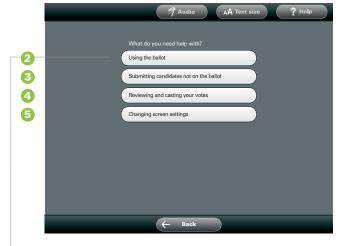
### **System alerts**



### **Accessing help**



From any screen the voter can access the Help main screen by touching the "Help" button 1.



### Main help screen

This screen serves as a hub, with four choices: the "Using the ballot" 2, "Submitting candidates not on the ballot" 3, and "Reviewing and casting your votes" 4 buttons all take the voter to detailed instructions on those topics. The fourth button, "Change screen settings" 5, leads to another hub, where voters can adjust language, text size, screen contrast, and color and turn on audio.

The background color for all Help screens changes to a darker gray to alert voters that they have left the ballot area.



### Using the ballot

Instruction screens provide detailed text instructions combined with an animation loop that highlights key features and processes.

### **Changing screen settings**



### Main help screen

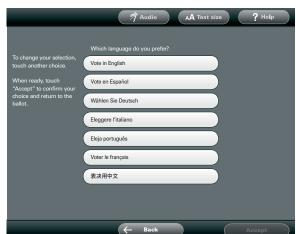
At the main Help screen, when voters touch the "Changing screen settings" button ①, they move to the main settings screen.



### Main change screen

The settings screen serves as a hub, with five buttons: "Text size" 2; "Language" 3; "Screen color and contrast" 4; "Audio" (on/off and volume adjustment) 5; and "Return settings to default" 6.

Touching the "Languages" button moves the voter to a screen containing a list of languages as shown below.

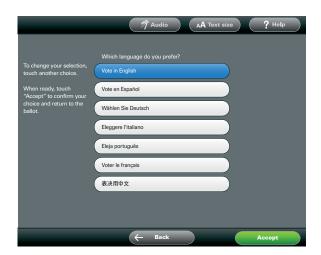


### Changing screen settings, continued



### Language settings screen

To change the language the voter is using during the voting session, the voter goes to the main change settings screen (see previous page). The voter also goes to the main change settings screen to change any other available setting—text size, contrast, or audio.



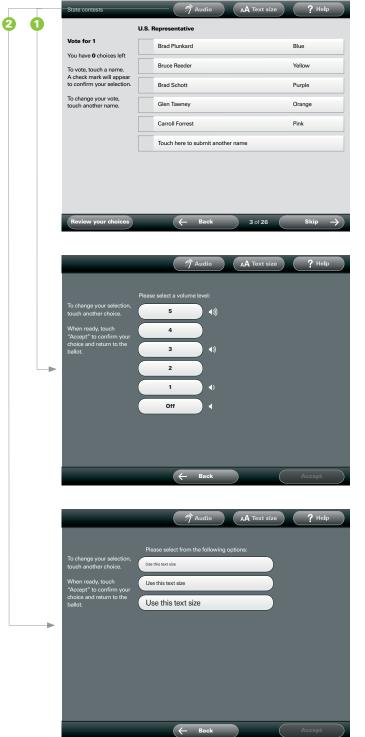
The voter chooses a language by touching the choice. The choice is highlighted and the "Accept" button changes from a dimmed state to green color.

The voter can touch a different button to switch to another language.



Touching the "Accept" button returns the voter to the previous voting screen.

### Persistent audio and text setting options



Available from every screen are two settings buttons, the "Audio" on/off and volume control 1; and the "Text size" setting button 2.

If the voter selects either of these buttons they will go directly to the appropriate settings page.

The audio settings button is not intended to replace conventional external audio setting hardware for low vision and blind voters. It is intended as a supplement for low-literacy voters or other voters who may have difficulty using a text- and graphics-only interface.

### Audio settings screen

The voter is instructed to begin setting the volume by touching the "1," the lowest volume setting button. A test tone sounds and the voter can adjust the volume accordingly. The choice is highlighted and the "Accept" button changes from a dimmed state to a green color (see page 5.20).

Touching the "Accept" button returns the voter to the previous screen.

The voter can touch a different button to readjust the volume.

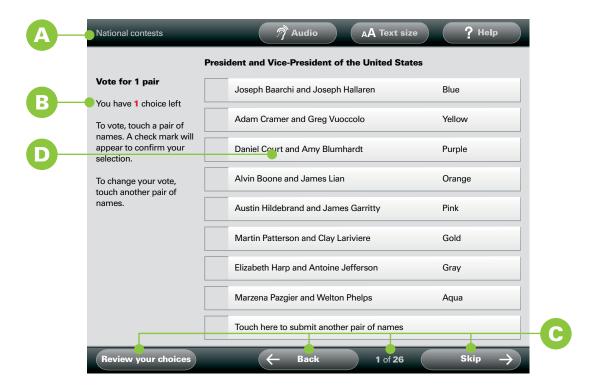
### Text size settings screen

Voters are instructed to choose their preferred text size. Touching the "Accept" button returns the voter to the previous voting screen.

## Design templates

The DRE ballot interface, similar to an optical scan ballot, comprises four main components:

- A Election information (e.g., jurisdiction, general election date).
- B Ballot instructions.
- © Ballot navigation (including "next," "back," "help," and "begin voting" buttons and screen numbers).
- Content area (including contests, retentions, and ballot measures, as well as settings, review, and casting options).

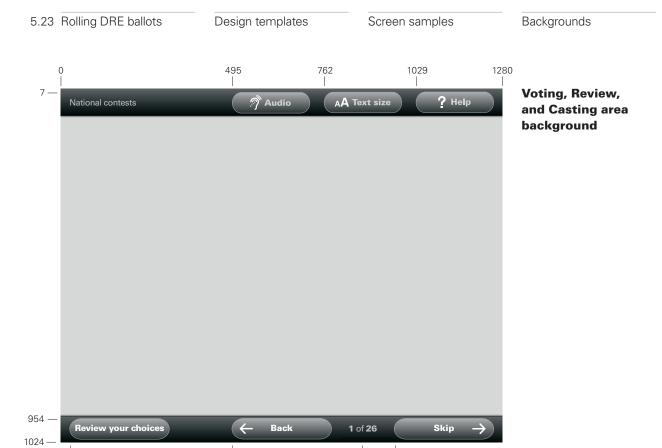


### **Electronic files**

Electronic versions of these files are available at www.eac.gov. The files are provided in two formats: Acrobat (.pdf) and InDesign (.indd).\* and are named "RollingDRE.pdf" and RollingDRE.indd."

The templates illustrate the interface design and provide guidelines for the DRE ballot produced by a vendor. As most vendor code is proprietary, this is the only way we can provide best practices.

<sup>\*</sup>The EAC does not endorse any specific product or vendor. The best practices illustrated throughout this document do not rely on specific software, products, or vendors. For copyright reasons, the EAC cannot supply election officials with the fonts used in the InDesign files. They are available from numerous suppliers.



762

966



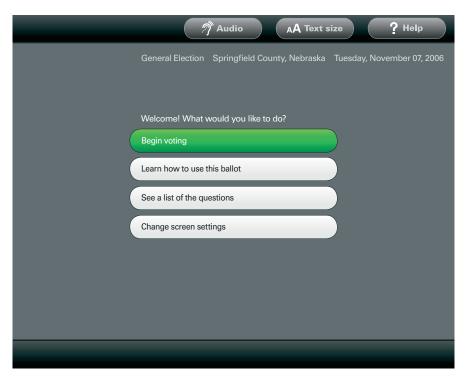
495

25

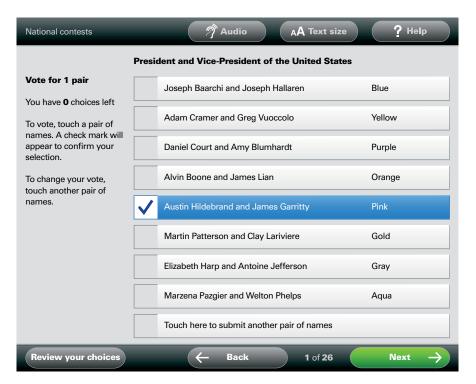
Introductory, Help, and Settings background



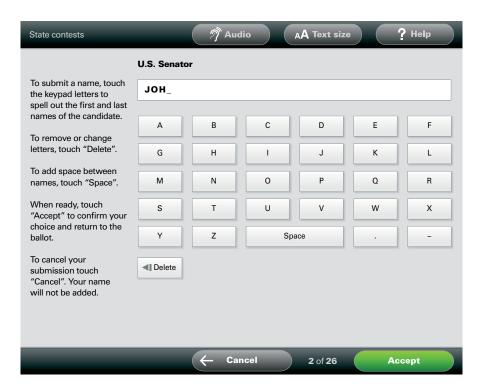
# Language selection screen



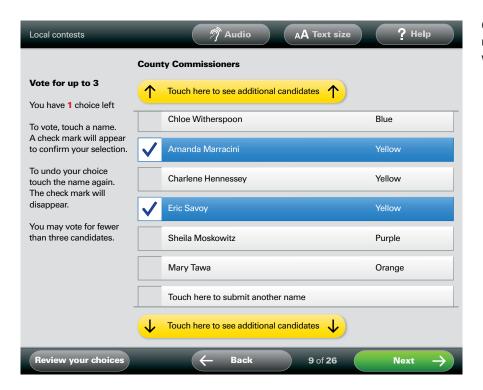
### Welcome screen



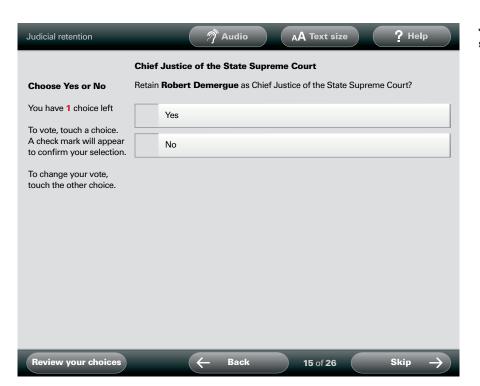
# Contest screen, single selection



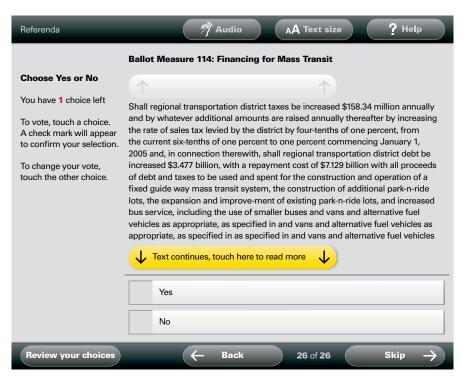
"Write-in" screen, single selection



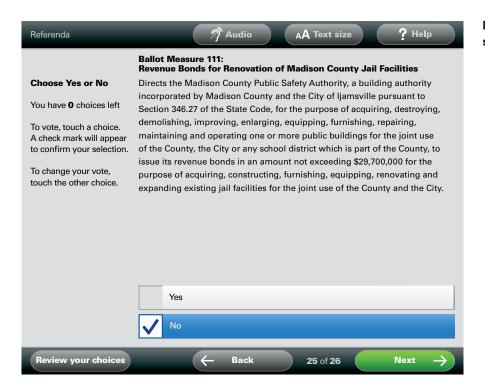
### Contest screen, multiple selections with scrolling



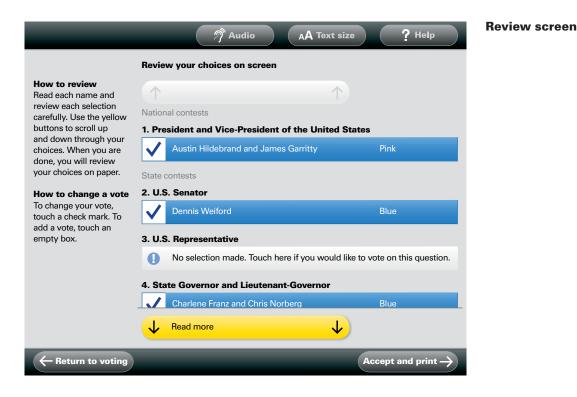
# Judicial retention screen



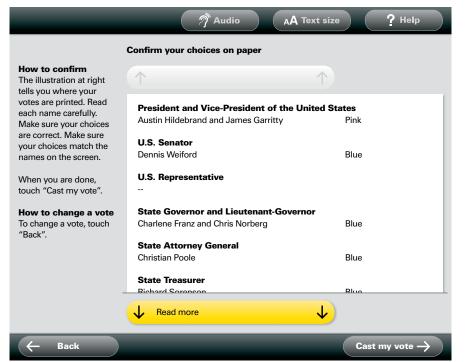
### Ballot measures screen, with scrolling

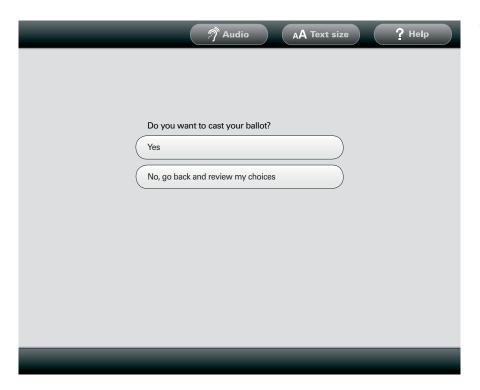


# Ballot measures screen, no scrolling





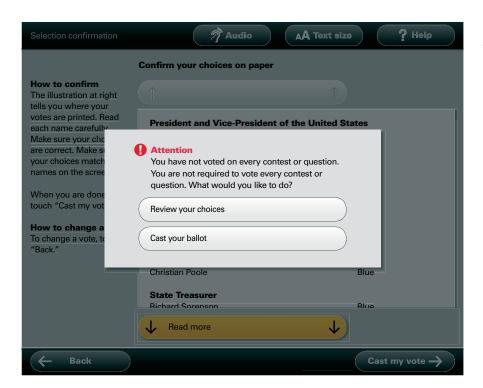




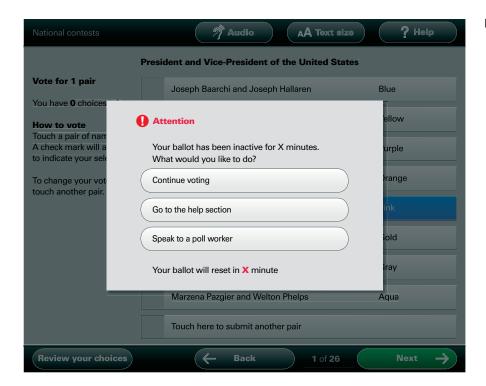
### Casting query screen



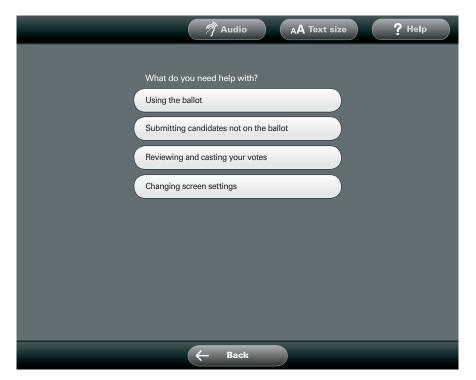
# Thank you for voting! screen



# Undervoting alert screen



### **Inactive alert screen**



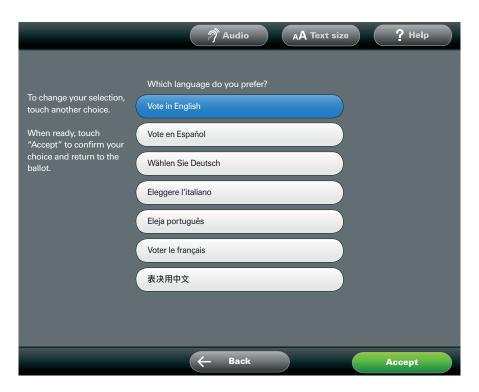
### Main help screen



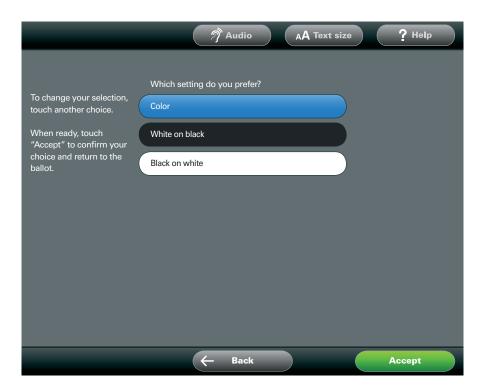
# Help screen: using the ballot



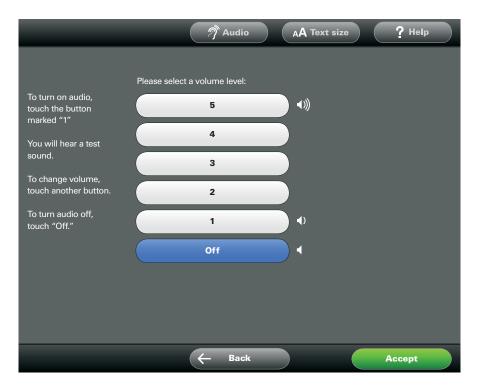
### Main settings screen



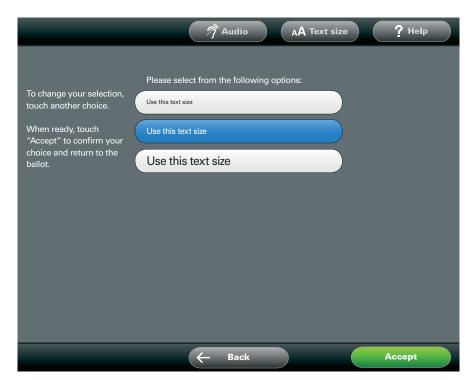
# Changing languages screen



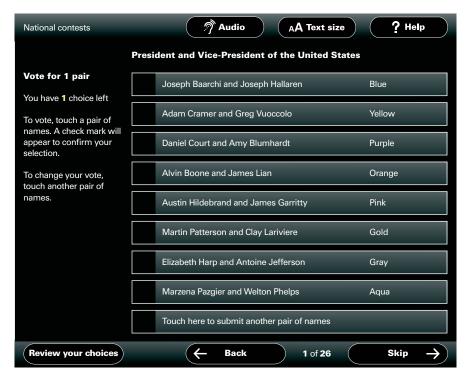
# Changing contrast and color screen



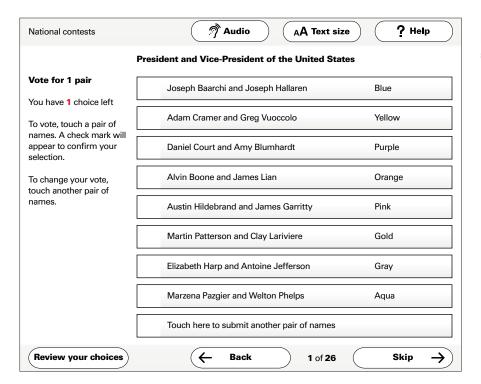
Turning audio on/off, adjusting volume screen



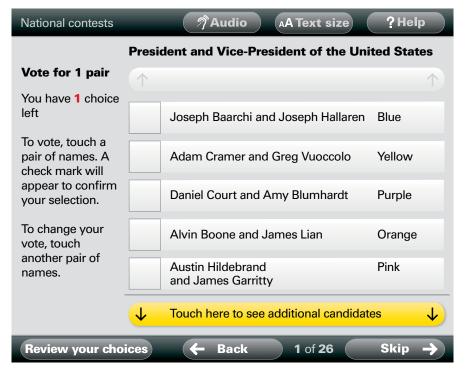
# Changing text size screen



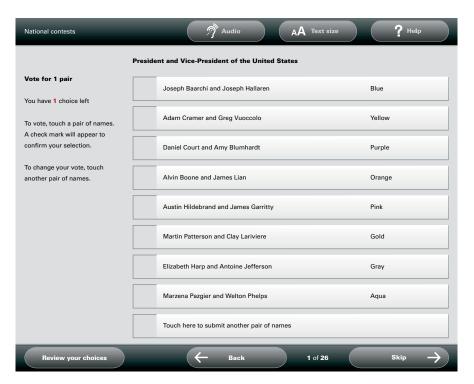
High contrast white-on-black screen



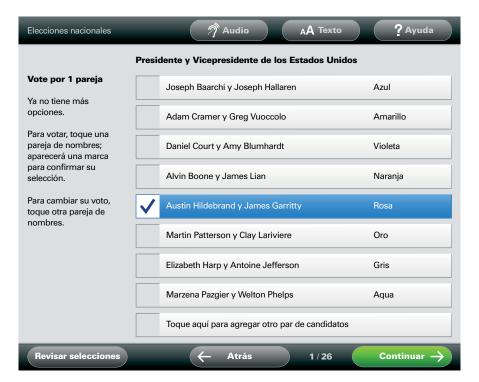
High contrast black-on-white screen



# Larger text setting screen



# Smaller text setting screen



Typical Spanishlanguage contest screen



Typical Chineselanguage contest screen