

Other Screen Readers to consider

JAWS and Window-Eyes

Why Learn about JAWS and Window-Eyes

Though we won't be using JAWS (Job Access for Windows) or Window-Eyes as our primary screen readers for accessibility testing purposes in the context of this course, it is still important to know about these screen readers, which together are used by a majority of screen reader users to operate their computers and navigate the Web. It is always a good idea to do a final test of Web content with JAWS or Window-Eyes before it goes into production.

You can test across all the major browsers using JAWS.

Key Features of JAWS

JAWS can be downloaded and installed on Windows in 40 minute mode, after which the computer must be rebooted before it will run for another 40 minutes, and so on. Though this is often enough time for developers to do some quick screen reader testing, be aware that it is best practice in web accessibility auditing for developers to purchase a JAWS license before using it for screen reader testing. Window-Eyes has a similar arrangement, running for 30 minutes before a reboot is required.

When using JAWS for screen reader testing, there are a few standard tests you should perform. No need to learn how to use all of JAWS, which can be difficult for inexperienced users who only use it periodically. The following is a list of the primary keyboard commands you should learn, based on JAWS 15+. These command correspond to some of the key WCAG guidelines, identified in Module 1 including listing and navigating, headings, links, landmarks, and so on. Though the commands will differ from those of other screen readers, the tests themselves will be the same.

JAWS Testing + Associated Key Command

Task	Task Description	Keyboard Commands
Default reading	When a webpage loads, JAWS will begin reading it automatically. Listen to the spoken output and note any inconsistencies from what one might expect to hear based on what is visible on the screen.	up and down arrows
Tab Navigation	When a pages has loaded, press the Tab key to move into the page and navigate through operable elements of the	Tab, Shift Tab

	<p>page like links and form (Shift-tab to move back). Listen to the output when these elements are in focus, and note any elements that are clickable, but not focusable with the keyboard.</p> <p>Also listen for hidden elements such as bypass links, or other elements that are not visible but are read aloud by JAWS.</p>	
Navigate through Headings	Step through all the headings on a page. Note whether all headings announced as expected? Note the heading level announced. Are they sequenced to create semantic structure (i.e. nested in the proper order).	H, Shift-H, 1 - 6 Insert - F6 (list)
Navigate through Landmarks	Step through the landmarks, key navigation points on a page. Are all areas of the page contained in a Landmarked region. Note any missing Landmarks	R, Shift-R Ctrl-Insert-R (list)
List Links	List the links on the page and navigate through them using the arrow key, listen for meaningfulness of link text, or listen for context when link text is otherwise meaningless.	Insert + F7 up and down arrows
Navigate through Forms	Navigate to forms on a page, then press the Tab or F keys to listen to each of the fields. Are fields announced effectively, including required field?	F, Shift-F Tab, Shift-Tab
Navigate through Tables	Navigate to Tables on a page, press Enter to go to a table, press up/down arrow keys to move through cells in sequence (left to right, top to bottom), press Ctrl+Alt+arrow to move to adjacent cells, press Ctrl-Alt and 5 on the number pad to list column and row headers where applicable. Note whether header cells are read or not. Are Fieldset labels announced, where applicable?	T, Shift-T + Enter up and down arrows Ctrl+Alt+up/down Ctrl-Alt-5 (num pad 5)

Note: to stop reading, press the esc key

Helpful JAWS and Window-Eyes Resources

A full list of JAWS key commands can be found on the Freedom Scientific site at the link below:

[New JAWS Keyboard Commands](#)

For a broader look at using JAWS to navigate through web content, the following video provides a useful overview of the keyboard commands that were introduced here, and a variety of others.

[Navigating Websites with JAWS \(7:26\)](#)

NVDA Screen Reader

Key Features of the NVDA Screen Reader

NVDA or NonVisual Desktop Access, is a **free open source screen reader** for Windows developed by NV Access, a not-for-profit organization setup to support the development of the software. Though not as refined as JAWS or Windows Eyes, it is a viable alternative. The voices tend to be more mechanical but if you can get past that, it is quite functional and a good alternative for full screen reader testing if licensing JAWS or Window Eyes is not an option. There are a variety of addon voices that tend to sound a little more human, some free and others for a nominal fee.

NVDA is now translated into 43 languages, and is quickly catching up to JAWS as the most used screen reader.

[Downloading and Installing NVDA](#)

NVDA Testing + Associated Key Commands

*By default the “NVDA key” mentioned below is the “Insert” key on a Windows keyboard, but can also be set to the “Caps Lock” key.

Task	Task Description	Keyboard Commands
Default reading	When a webpage loads, NVDA will begin reading it automatically. Listen to the spoken output and note any inconsistencies from what one might expect to hear based on what is visible on the screen.	up and down arrows
Tab Navigation	When a pages has loaded, press the Tab key to move into the page and navigate through operable elements on the page like links and forms (Shift-tab to move back). Listen to the output when these elements are in focus, and note any elements that are clickable, but not focusable with the keyboard. Also listen for hidden elements such as bypass links, or other elements that are not visible but are read aloud by NVDA.	Tab, Shift Tab
Navigate through Headings	Step through all the headings on a page. Note whether all heading announced as expected? Note the heading level announced. Are they sequenced to create semantic structure (i.e. nested in the proper order).	H, Shift-H, 1 - 6 NVDA + F7 up and down arrows
Navigate through Landmarks	Step through the landmarks, key navigation points on a page. Are all areas of the page contained in a Landmarked region. Note any missing Landmarks.	NVDA + F7 up and down arrows

List Links	List the links and navigate through them using the arrow keys, listen for meaningfulness of link text, or listen for context when links are otherwise meaningless.	NVDA + F7 up and down arrows
Navigate through Forms	Navigate to forms on a page, then press the Tab or F keys to listen to each of the fields. Are fields announced effectively, including required field. Navigate to forums on a page, then press the Tab or F keys to listen to each of the fields. Are fields announced effectively, including required field,	F, Shift-F Tab, Shift-Tab
Navigate through Tables	Navigate to Tables on a page using the "T" key, press Enter to go to a table, press up/down arrow keys to move through cells in sequence (left to right, top to bottom), press Ctrl+Alt+arrow to move to adjacent cells. Note weather header cells are read or not. They should read automatically when navigating to a data cell. Are Fieldset labels announced, where applicable?	T, Shift-T + Enter up and down arrows Ctrl+Alt+up/down/left/right

Note: to stop reading, press the Esc or Ctrl key

Helpful NVDA Resources

[NVAccess \(Download NVDA\)](#)

[NVDA Voices](#)

[NVDA Community, Documentation Etc.](#)

[Quick List of Keyboard Command](#)

VoiceOver for Mac and iOS

Why Learn about VoiceOver for Mac and iOS

As illustrated earlier in this unit by the WebAIM Screen Reader User survey, VoiceOver usage has increased significantly over the past few years with usage numbers not far behind those of JAWS and NVDA. As a result it is a good idea to do some testing with VoiceOver to ensure Web content is accessible and usable for Mac and iOS users.

Key Features of VoiceOver for Mac and iOS

Apple has created a screen reader called Voiceover, which is built in to the Mac operating system, and included with iOS for iPhone and iPad. There is no need to install any extra

software. Because it is tightly integrated into these systems, it tends to function better than the typical add-on screen readers of other operating systems.

When navigating the Web, VoiceOver works best with Safari, though many features will also work with FireFox and Chrome. When testing with VoiceOver, using Safari as the browser is recommended.

VoiceOver Testing on Mac + Associated Key Commands

* Start and stop VoiceOver Command+F5

* VoiceOver keys (VO) = Control + Option pressed together

Task	Task Description	Keys
Default reading	When a webpage loads, VoiceOver will the title of the page automatically. Use the left and right arrow keys to move through content and listen to the spoken output and note any inconsistencies from what one might expect to hear base on what is visible on the screen.	VO + left and right arrows VO + A
Tab Navigation	When a pages has loaded, press the VO + right arrow to move from into the web content area of the browser, then press the Tab key to navigate through operable element of the page like links and forms. Listen to the output when these elements are in focus, and note any elements that are clickable, but not operable with the keyboard. Also listen for hidden elements such as bypass links, or other elements that are not visible but are read aloud by VoiceOver.	Tab, Shift Tab
Navigate through Headings	Step through all the headings on a page directly or using the Web Rotor (VO + U) . See the Web Rotor Tutorial video below for details . Note whether all heading announced as expected? Note the heading level announced. Are they sequenced to create semantic structure.	VO + Command + H, VO + Command + Shift + H, or VO + U + right arrow up and down arrows
Navigate through Landmarks	Using the VoiceOver Web Rotor use the right arrow to move to the Landmarks pane. Use the up and down arrows to step through the landmarks on a page. Are all areas of the page contained in a Landmarked region. Note any missing Landmarks.	VO + U + right arrow up and down arrows Note: Web Rotor does not work with current versions of FireFox

List Links	List the links and navigate through them using the Web Rotor, listen for meaningfulness of link text, or listen for context when links are otherwise meaningless.	VO + U + right arrow up and down arrows or Tab, Shift-Tab
Navigate through Forms	Navigate to forms on a page using the Web Rotor Form Controls pane, using the up and down arrows to move through form elements. Are fields announced effectively, including required fields?	VO + U + right arrow up and down arrows or Tab, Shift-Tab
Navigate through Tables	Navigate to Tables on a page using the Web Rotor, use the up/down arrows and press Enter to go to a table. Press arrow keys while in a table to move through cells. Note whether header cells are read or not. They should read automatically when navigating to a data cell. Are Fieldset labels announced, where applicable.	VO + U + right arrow up and down arrows and to move through cells VO + arrows and to read column header VO + C and to read row header VO + R

Note: to stop reading, press the Esc or Ctrl key

Helpful VoiceOver Resources

[VoiceOver Guide](#)

[VoiceOver Basics Tutorial](#)

[VoiceOver Gestures Tutorial](#)

[Voiceover Rotor Tutorial](#)

VoiceOver on iOS

VoiceOver on an iOS device, such as an iPad, works much like it does on Mac. Once enabled it operates with a variety of flicks or swipes, taps, and twists, called gestures. Though the focus above has been on keyboard operation, with a trackpad Mac users can also make use of gestures.

VoiceOver on iOS is enabled through Settings>General>Accessibility. Though iOS devices can be connected to a keyboard via bluetooth, and many of the keyboard commands described above can be used, here we will focus on gestures, assuming no keyboard is connected.

The following table outlines common gestures and their resulting action.

Gesture	Action
flick right/left	move to next/previous item
double/triple tap	activate the selected item
touch	select item under your finger
two finger flick down	read page starting at selected item
two finger flick up	read page starting at the top
two finger single tap	pause or continue speech
three finger flick down/up	scroll up/down one page
three finger single tap	speak page number or rows being displayed
three finger flick right/left	scroll left/right one page
three finger double tap	toggle speech on/off
rotate clockwise	select next rotor setting
rotate counter clockwise	select previous rotor setting
pinch open/close	select/unselect text
rotate two finger	activate rotor
one finger swipe down/up	next/previous rotor item

For accessibility testing purposes, it is helpful to use the Web rotor, activated by twisting two fingers in a clockwise or counterclockwise rotation, and repeating until to rotor item you are looking for is announced, either tables, landmarks, containers, characters, words, headings, links, or form controls. Then use a single swipe of one finger up or down to move through the rotor items selected. This is useful for identifying the structural element present that help with navigating through various parts of a web document.

For more about gestures, see:

Audible Sight: [VoiceOver complete listing of Gestures and Keyboard Commands](#)

To see VoiceOver in action on an iPad (much like iPhone, iWatch, and Mac) see: [Introduction to Apple VoiceOver](#)

Android Talkback Screen Reader

Key Features of Android Talkback Screen Reader

For those using Android phones or tablets, the open source Talkback screen reader comes with the operating system. Its purpose is much like Voiceover on iOS devices, voicing elements and content on the screen of the device, though the gestures used differ. Like iOS Rotor, Android has the local and global context menu that operates in a similar way. When testing with Talkback, it is best to use FireFox as the browser, which has the best support of the available browsers, for WAI ARIA, as well as being able to swipe through headings, list items, links, form elements, and landmarks.

To enable Talkback you'll find the setting in:
Settings>Accessibility>Talkback

Also be sure to enable Enhanced Web Accessibility
Settings>Accessibility>Enhanced web accessibility

Core Talkback gestures can be found in the table below, applicable to Android KitKat 4.4 and above. Earlier versions do not include the context menus, so testing access to headers, lists, and links etc, can only be done with the default swiping through screen elements in the sequence they appear.

Action	Gesture
Turn Talkback on and off	Press the power key and hold two fingers on screen
Speak element	Single tap
Activate an element	Double tap
Scroll	Two finger slide
Zoom	One finger triple tap
Select next item	Swipe right / down
Select previous	Swipe left / up
Move to first item on screen	Up then down
Move to last item on screen	Down then up

Scroll forward (if you're on a page longer than one screen)	Right then left
Scroll back (if you're on a page longer than one screen)	Left then right
Move slider down (such as volume)	Left then right
Home button	Up then left
Back button	Down then left
Recent apps	Left then up
Notifications	Right then down
Open local context menu	Up then right
Open global context menu	Down then right

Source: [Paciello Group](#)

Firefox also has support for Quick keys when a keyboard is attached via Bluetooth, much like the quick keys with JAWS and NVDA.

Keystrokes will only work when focus is in the HTML and not on the browser User Interface or in a text field.

Key	Description
a	Moves to next named anchor
b	Moves to next button
c	Moves to next combobox or listbox
e	Moves to next text entry or password field
f	Moves to next form field (button, combobox, text entry, radio button, slider, checkbox)
g	Moves to next graphic
h	Moves to next heading of any level
i	Moves to next item in an unordered, ordered or definition list
k	Moves to next hyperlink

l	Moves to next unordered, ordered or definition list
p	Moves to next page tab (in ARIA-enabled web apps)
r	Moves to next radio button
s	Moves to next separator
t	Moves to next data table
x	Moves to next checkbox

There is no gesture to navigate by data tables however Firefox will announce the table header together with the focused cell.

Source: [Paciello Group](#)

Helpful TalkBack Accessibility Resources

[JellyBean Accessibility TalkBack Explore](#) by Touch Tutorial

[Latest Android Accessibility Features](#) (start at 11:48)

[Android Talkback Gestures](#)

[Getting Start on Android with Talkback](#)

[Accessibility testing with Android Talkback](#)