

## CHAPTER 18

# Accessibility

Microsoft is committed to making computers easier to use for everyone, including individuals with disabilities. Personal computers are powerful tools that enable people to work, create, and communicate in ways that might otherwise be difficult or impossible. This vision of enabling all people can be realized only if individuals with disabilities have equal access to the powerful world of personal computing.

The issue of computer accessibility in the home and workplace for people with disabilities is becoming increasingly important. Seven to nine out of every ten major corporations employ people with disabilities who may need to use computers as part of their jobs. In the U.S. alone, an estimated 30+ million people have disabilities that can potentially limit their ability to use computers. Additionally, as the population ages, even more people will experience functional limitations, causing the issue of computer accessibility to become even more important to the population as a whole.

Legislation, such as the Americans with Disabilities Act (which affects private businesses with more than 15 employees) and Section 508 of the Rehabilitation Act (which addresses government spending), also brings accessibility issues to the forefront in both the public and private sectors.

Microsoft already offers a number of products specifically for users with disabilities and includes features in our mainstream software products that help make them more accessible. Our two most prominent accessibility products are Access Pack for Microsoft Windows and AccessDOS. Both were developed by the Trace Research and Development Center at the University of Wisconsin-Madison, using research funded by NIDRR. Microsoft recently followed these up by releasing Access Pack for Microsoft Windows NT. These products enhance the Windows, MS-DOS, and Windows NT operating systems by adding a variety of features which make the computer more accessible for users with limited dexterity or hearing impairments. Microsoft distributes these utilities at no charge to the customer, and documents their availability with each of our new products.

Windows 95 offers several enhancements designed to make the system more accessible and easier to use for individuals with disabilities. In recent years Microsoft has established close relationships with users who have disabilities, organizations representing disabled individuals, workers in the rehabilitation field, and software developers who create products for this market. Based on their combined input, Microsoft has defined specific design goals for Windows 95:

- u Integrate and improve the features from Access Pack which compensate for difficulties some individuals have using the keyboard or the mouse
- u Make the visual user interface easier to customize for people with limited vision
- u Provide additional visual feedback for users who are deaf or hard-of-hearing
- u Provide new API and “hooks” for Independent Software Vendors (ISVs) developing third-party accessibility aids, including those which allow blind individuals to use Windows
- u Make information on accessibility solutions more widely available and increase public awareness of these issues

Throughout the Windows 95 product, enhancements designed to meet these goals are included. This section describes the enhancements to the product which will make computing easier for individuals who have disabilities.

## Summary of Improvements Over Windows 3.1

The primary improvements in accessibility for Windows 95 are:

- u Scaleable user-interface elements
- u Compensate for difficulties using the keyboard
- u Keyboard emulation of the mouse
- u Support alternative input devices which emulate the keyboard and mouse
- u Provide visual cues to tell the user when the application is making sounds
- u Advise applications when the user has limited vision
- u Advise applications when the user needs additional keyboard support due to difficulty using a mouse
- u Advise applications when the user wants visual captions to be displayed for speech or other sounds

- u Advise applications when they should modify their behavior to be compatible with accessibility software utilities running in the system
- u Optimize keyboard layouts for users who type with a single hand, a single finger or a mouthstick
- u Include audible prompts during Setup for users who have low vision
- u Color schemes which are optimized for users with low vision
- u Include accessibility information in our documentation

## General Accessibility Enhancement Features

### Online Help

An Accessibility section in the Windows 95 help contents and index provides a quick reference and pointer to topics that can help adjust the behavior of the system for people with disabilities.

### Controlling the Accessibility Features

Most of the accessibility features described in this section are adjusted through the Accessibility Options icon in Control Panel in Windows 95. This allows you to turn the accessibility features on or off and to customize timings, feedback, and other behavior for your own particular needs.



**Figure 1. The Accessibility Features property sheet in Control Panel**

## Emergency Hotkeys

Most of the accessibility features described in this section are adjusted through the Control Panel. But if a user is unable to use the computer until an accessibility feature is turned on, how can they use Control Panel to activate it? This chicken-and-the-egg problem is solved by providing emergency hotkeys which by which a user can temporarily turn on the specific feature he or she needs. Then, once a feature is turned on, the user can navigate to Control Panel and adjust the feature to his or her own preferences, or turn it on permanently.

The same hot-key can use used to temporarily turn off one of the features, if it gets in the way or to enable another person to use the computer.

We have been worked hard to make sure that the emergency hotkeys will not get in the way of users who don't need them. Each hot-key is designed to be obscure key combinations or key sequences which should not conflict with applications. If such a conflict does arise, the hotkeys can be disabled, and the user can still use the feature or not as needed.

As an additional precaution, each emergency hot-key plays a rising tone, and also brings up a confirmation dialog box that briefly explains the feature and how it was activated. If the user pressed the hot-key unintentionally, this allows the user to cancel the feature's activation. It also provides a quick path to more detailed Help and the Control Panel settings for that feature, allowing the user to disable the hot-key permanently.

## Accessibility TimeOut

The Accessibility TimeOut turns off Access Pack's functionality after the system has been idle for a certain period of time. It returns the system to its default configuration. This feature is useful on machines shared by multiple users.

The Accessibility TimeOut can be adjusted using Control Panel.

## Accessibility Status Indicator

An optional visual indicator is provided that tells the user which accessibility features are turned on, helping users unfamiliar with the features identify the cause of unfamiliar behavior. The indicator also provides feedback on the keys and mouse buttons currently being "held down" by the StickyKeys and MouseKeys features. The status indicator can be displayed on the system Task Bar, or as a free-floating window, and can be displayed in a choice of sizes.



**Figure 2. The Accessibility Status Indicator Window**

## Features for Users with Low Vision

### Scaleable User Interface Elements

Users who have limited vision or who suffer eyestrain during normal use of Windows can now adjust the sizes of window titles, scroll bars, borders, menu text, and other standard screen elements. These sizes are completely customizable through the Control Panel in Windows 95. You can also choose between two sizes for the built-in system font.

### Customizable Mouse Pointer

Users who have difficulty seeing or following the mouse pointer can now choose between three sizes: normal, large, and extra large. They are also able to adjust the color or add animation, both of which can increase the pointer's visibility.

### High-Contrast Color Schemes

The Windows color schemes allows users to choose from several well-designed sets of screen-color options designed both to match users' individual tastes and to meet their visual needs. The new color schemes in Windows 95 include high-contrast colors designed to optimize the visibility of screen objects, making it easier for users with visual impairments.

### High-Contrast Mode

Many users with low vision require high contrast between foreground and background objects to be able to distinguish one from the other. For example, they may not be able to easily read black text on a gray background, or text drawn over a picture. Users can now set a global flag to advise Windows 95 and applications that they need information presented with high contrast.

Windows 95 also provides an emergency hot-key which allows a person to set the computer into high-contrast mode when they may be unable to use Control Panel, or when the current color scheme makes the computer unusable for them. This hot-key allows them to choose an alternate color scheme which better meets their needs.

High-Contrast Mode can be turned on or off using an emergency hot-key, by pressing left ALT, left SHIFT, and PRINT SCREEN keys simultaneously.

# Features for Making Keyboard and Mouse Input Easier

## StickyKeys

Many software programs require the user to press two or three keys at one time. For people who type with a single finger or a mouthstick, that just isn't possible. StickyKeys allows users to press one key at a time and instructs Windows to respond as if they had been pressed simultaneously.

When StickyKeys is on, pressing any modifier key (that is, CTRL, ALT, or SHIFT) will latch that key down until you release the mouse button or a non-modifier key. Pressing a modifier key twice in a row will lock it down until it is tapped a third time.

StickyKeys functionality is adjusted using the Control Panel, or it can be turned on or off using an emergency hot-key, by pressing the SHIFT key five consecutive times.

## SlowKeys

The sensitivity of the keyboard can be a major problem for some individuals, especially if they often press keys accidentally. SlowKeys instructs Windows to disregard keystrokes that are not held down for a minimum period of time. This allows a users to brush against keys without any ill effect, and when the user get a finger on the proper key, the user can hold the key down until the character prints to the screen.

SlowKeys functionality is adjusted using the Control Panel, or it can be turned on or off using an emergency hot-key, by holding down the right SHIFT key for eight seconds. (This hot-key also turns on RepeatKeys.)

## RepeatKeys

Most keyboards allow users to repeat a key just by holding it down. This feature is convenient for some, but can be a major annoyance for people who can't lift their fingers off the keyboard quickly. RepeatKeys lets users adjust the repeat rate or disable it altogether.

RepeatKeys is adjusted using the Control Panel, or it can be turned on or off using an emergency hot-key, by holding down the right SHIFT key for eight seconds (This hot-key also turns on SlowKeys.)

## BounceKeys

For users who “bounce” keys, resulting in double strokes of the same key or other similar errors, BounceKeys instructs Windows to ignore unintended keystrokes.

BounceKeys is adjusted using the Control Panel, or it can be turned on or off using an emergency hot-key, by holding down the right SHIFT key for twelve seconds. You will hear an up-siren after eight seconds, and another double-tone after twelve seconds. Releasing the SHIFT key after the double-tone will activate BounceKeys.

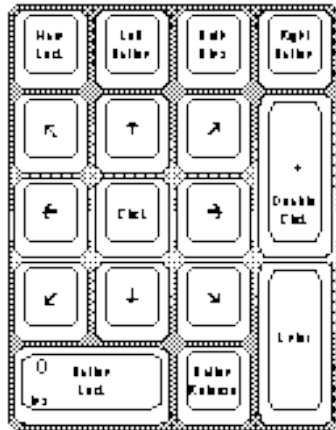
## MouseKeys

This feature lets individuals control the mouse pointer using the keyboard. Windows 95 is designed to allow the user to perform all actions without needing a mouse, but some applications may require one, and a mouse may be more convenient for some tasks. MouseKeys is also useful for graphic artists and others who need to position the pointer with great accuracy. You do not need to have a mouse to use this feature.

When MouseKeys is on, use the following keys to navigate the pointer on your screen:

- u Press any number key except 5 (these are also called the direction keys) on the numeric keypad to move the pointer in the direction indicated by Figure 3.
- u Use the 5 key for a single mouse-button click and the + key for a double-click.
- u To drag and release an object, with the pointer on the object, press INS to begin dragging, then move the object to its new location and DEL to release it.
- u Select the left, right, or both mouse buttons for clicking by pressing the /, -, or \* key, respectively.
- u Hold down the CTRL key while using the direction keys (numeric keys, except for 5) to “jump” the pointer in large increments across the screen.
- u Hold down the SHIFT key while using the direction keys to move the mouse a single pixel at a time for greater accuracy.





**Figure 3. Keys on the numeric keypad that control the mouse pointer**

MouseKeys can be adjusted using the Control Panel, or it can be turned on or off using an emergency hot-key, by pressing the left ALT, left SHIFT and NUM LOCK keys simultaneously.

## ToggleKeys

ToggleKeys provide audio cues—high and low beeps—to tell the user whether a toggle key is active or inactive. It applies to the CAPS LOCK, NUM LOCK, and SCROLL LOCK keys.

ToggleKeys can be adjusted using the Control Panel, or it can be turned on or off using an emergency hot-key, by holding down the NUM LOCK key for eight seconds.

## Features for Users Who Are Hearing-Impaired

### ShowSounds

Some applications present information audibly, as wave-files containing digitized speech or through audible cues that each convey a different meaning. These cues might be unusable by a person who is deaf or hard-of-hearing, someone who works in a very noisy environment, or someone who turns off the computer's speakers in a very quiet work environment. In Windows 95, you can set a global flag to let applications know you want visible feedback—in effect asking the applications to be “close captioned”.

### SoundSentry

SoundSentry tells Windows to send a visual cue, such as a blinking title bar or screen flash whenever there is a system beep. This allows users to see the message that may not have been heard.

## Support for Alternative Input Devices

### SerialKeys

This feature, in conjunction with a communications aid interface device, allows the user to control the computer using an alternative input device. Such a device needs only to send coded command strings through the computer's serial port to specify keystrokes and mouse events which are then treated like normal keyboard and mouse input.

### Support for Multiple Pointing Devices

The new Plug and Play architecture in Windows 95 inherently supports multiple pointing devices all cooperating together. This allows seamless addition of alternative pointing devices, such as head-pointers or eye-gaze systems without the need to replace or disable the normal mouse.

# Features for Software Developers

## Accessibility Guidelines for Software Developers

Windows 95 contains many built-in features designed to make the computer more accessible to people with disabilities. To make a computer running Windows 95 truly accessible, application developers must provide access to their applications' features, taking care to avoid incompatibilities with accessibility aids.

As part of the *Software Development Kit for Windows 95* and *User Interface Design Guidelines for Windows 95*, Microsoft has provided developers with documentation which not only outlines these important concepts, but provides technical and design tips to help ISVs produce more accessible applications. Most of these tips will mean very little additional work to the designer, as long as the application designer is aware of the issues and incorporates accessibility into the application design at an early stage. By providing this information to application developers, Microsoft hopes to increase the general level of accessibility of all software running on the Windows platform.

## Methods for Simulating Input

Windows 95 now allows developers of voice-input systems and other alternative input systems to easily simulate keyboard and mouse input using fully documented and supported procedures.

## Chaining Display Drivers

Some accessibility aids, such as screen review packages for low-vision users, need to detect information as it is drawn to the screen. Windows 95 supports chaining display drivers that allow these utilities to intercept text and graphics being drawn, without interfering with the normal computer operation.

## New Common Controls

Many accessibility aids have difficulty working with applications which implement non-standard controls. Windows 95 introduces a whole new set of controls available for mainstream software developers, and these standardized implementations are designed to cooperate with accessibility aids.

## Try It!



Accessibility  
Options

To see how these accessibility features in Windows 95 make it easy to customize the appearance and behavior of your computer, you can try them out yourself!

### Don't Touch that Mouse

Press the left ALT, the left SHIFT and the NUM LOCK keys simultaneously, and you'll be able to drag-and-drop, and click or double-click both the primary and right mouse buttons simply using your keyboard's numeric keypad. For more information, see the "MouseKeys" section above.

### Try Typing With a Pencil

Suppose you could only type with a single finger, or with a stick held between your teeth. How would you press ALT+ TAB? Press a SHIFT key consecutive five times to try out StickyKeys. Once it's activated, press the ALT key and see what happens. Press TAB and you'll have just typed two keys at once with a single finger. Press the ALT key twice, then press TAB a few times to see the ALT+ TAB window and cycle through all the tasks you have running. When you're satisfied, press ALT one more time to release it. When you're ready to move on you can turn off this feature just by pressing two keys at the same time. Don't forget to watch the status indicator on the system Task Bar!

### Support for MS-DOS-based Applications

All of the accessibility features described here are available even when you're running MS-DOS-based applications. Start an MS-DOS application and try StickyKeys or MouseKeys—these features are available any time you need them, whatever you may be doing.

### Take a New Look

Imagine that you couldn't read black text on a gray background, because all the lines blurred together. Press Left ALT + Left SHIFT + PRINTSCREEN and see if you find an appearance that's more suitable to your needs.

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