

## A P P E N D I X E

# Accessibility for People with Disabilities



Microsoft is dedicated to making its products and services accessible and usable for everyone. Microsoft® Windows® 2000 includes new and enhanced accessibility features that benefit users in all enterprises and professions. These features make it easier to customize the computer and give users with disabilities better access to the programs and applications they need to do their work.

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**Appendix Goals**

This appendix will help you develop the following:

- A plan for accommodating operating system built-in features and third-party add-on devices for users with disabilities.
- A prioritized list of components and features for Windows 2000 upgrade considerations.

**Related Information in the Resource Kit**

- For more information about installing software, see “Software Installation and Maintenance” in the *Microsoft® Windows® 2000 Server Resource Kit Distributed Systems Guide*.
- For more information about using Group Policy, see “Group Policy” in the *Microsoft Windows 2000 Server Resource Kit Distributed Systems Guide*.

## Overview of Accessibility in Windows 2000

Accessibility means equal access to computer software for everyone, including people with cognitive, hearing, physical, or visual disabilities. Cognitive disabilities can mean learning impairments, Down syndrome, dyslexia, and language impairments such as illiteracy. Users with hearing disabilities include people who are deaf or hard-of-hearing. Physical disabilities include cerebral palsy, tremors, seizures from epilepsy, lack of limbs or digits, and paralysis. Visual impairments include blindness and various kinds of low vision, such as colorblindness and tunnel vision. For Windows 2000, accessibility means making computers more usable through a flexible, customizable user interface, alternative input and output methods, and better visibility of screen elements.

## Accessibility Benefits with Windows 2000

The number of individuals with disabilities who use computers is growing, and with that growth comes a greater need for employers to accommodate them with assistive technologies. Recent legislation, including the Workforce Investment Law of 1998, mandates such accommodation. To the greatest extent possible, employees with disabilities must have computer access that is comparable to access by employees who do not have disabilities. To this end, several technologies that are built into Windows 2000 are available so that enterprises can configure their computers with the accessibility features they need.

Many of these features have added functionality beyond Microsoft® Windows® 98 and Microsoft® Windows NT® operating systems. New features, as well as existing ones, are described in this appendix. Some of the new and significantly enhanced features and tools in Windows 2000 are Microsoft® Active Accessibility®, Accessibility Wizard, Magnifier, Narrator, On-Screen Keyboard, Utility Manager, high-visibility mouse pointers, Synchronized Accessible Media Interchange (SAMI), and high-contrast color schemes.

With Windows 2000, users and administrators can perform the following functions:

### **Override defaults for multiple-user customized settings.**

Administrators can set a wide range of accessibility and other options for groups of users by using Control Panel, the Accessibility Wizard, and Utility Manager.

**Quickly and easily navigate Windows.** Special features, such as hot keys and Active Desktop™, facilitate access to objects on the desktop, Windows Explorer, other servers on the network, and Internet Explorer; give quick access to Windows; and help users open folders and create individualized settings.

**Use a wider range of assistive technology.** With Microsoft Active Accessibility, applications work more effectively with third-party and other add-on accessibility aids, such as speech recognition systems and other forms of assistive devices. Invisible to the user, Active Accessibility upgrades and extends the Microsoft Windows operating system.

**Customize input methods.** Expanded configurations of keyboards, including On-Screen Keyboard, special mouse settings, and other options, let users customize their user interface (UI) schemes.

**Configure options through a single entry point.** Located in the Start menu, the Accessibility Wizard makes it possible for administrators and users to set up computers with the most commonly used features and to customize those features for each user.

**Magnify a portion of the screen for an enlarged display.** Several abbreviated features, such as Magnifier, make it possible for users to work away from their customary assistive devices.

**Maneuver within Windows.** Keyboard shortcuts and personalized keyboard options assist users who are working in programs and applications.

**Set sound options to suit individualized hearing needs.**

In addition to customizable features, such as volume adjustment and multimedia options, several accessibility features, such as ShowSounds and SoundSentry, give people with hearing impairments control of their audio environment.

**Set options for users with visual requirements.** Features include Narrator, a text-to-speech utility that is built into the operating system; ToggleKeys, a feature that provides audio cues when the user presses certain locking keys; and event cues that are located in the Sounds and Multimedia icon in Control Panel.

**Use keyboard filters to customize keys to aid various cognitive, hearing, mobility, and visual needs.**

The FilterKeys feature adjusts keyboard response time and forgives accidental pressing of keys.

**Assign contrast, color, timing, and sizing schemes for screen elements.**

Expanded ranges of screen elements, such as high-visibility mouse pointers and high-contrast color schemes, and the Accessibility Wizard give users options that suit their needs and preferences, such as greater visibility of the insertion point indicator (sometimes called the caret) and the ability to turn off animations.

**Gain greater control of the personal computer by using third-party devices.**

The SerialKeys feature is designed for people who are unable to use standard UI options and need add-on assistance from augmentative devices. This feature allows users to attach an alternative input device to the computer's serial port.

## Considerations Before Upgrading to Windows 2000

Microsoft and other developers of software and hardware features are continuously working to improve options for people with disabilities. Because of this effort, some accessibility features might still be in development or testing when new versions of software are released. Sometimes, new features are completed after a release and are included with the next version. Also, some technologies have not yet been created that are compatible with, or that can be built into, Windows 2000. For these reasons, information technology professionals need to carefully review the needs of the users they support before deploying to enterprises that have accessibility requirements. As part of your deployment planning and testing, make sure that you test all required assistive devices for compatibility with Windows 2000.

You might consider upgrading selected existing features and programs on your computers, rather than making a complete Windows 2000 installation. The upgrade process can be automated, and with Active Directory™ directory service, you can manage Group Policy object applications within an organizational unit, a domain, or a site. Although a complete installation, sometimes called a clean installation, allows a partitioned combination, it does not migrate settings from the previous operating system, which means that users lose personalized settings and applications.

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**Note** Whether you do a complete installation or an upgrade, it is important to do so with an updated Basic Input/Output System (BIOS) that is compatible with Windows 2000.

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With assigned applications in Group Policy, administrators can advertise objects so that when a user selects them on the Start menu, the objects are automatically installed. Administrators might delete applications assigned in this way. When administrators publish applications instead of assigning them, the user has the option of installing them using Add/Remove Programs in Control Panel.

Active Accessibility is a core component in the Windows operating system that is built on Component Object Model (COM) and that defines how applications can exchange information about user interface (UI) elements. This technology reduces incompatibility with some accessibility aids but does not yet offer complete compatibility.

For more information about current technologies, see the Microsoft Accessibility link on the Web Resources page at

<http://windows.microsoft.com/windows2000/reskit/webresources>.

For more information about installing software, see “Software Installation and Maintenance” in the *Microsoft® Windows® 2000 Server Resource Kit Distributed Systems Guide*.

## Deploying Windows 2000 for Accessibility

Although the accessibility tools released with Windows 2000 provide some functionality for users with special needs, most users with disabilities need assistive tools with higher functionality for their daily use. By using hardware and software that independent vendors develop, people with disabilities can enhance their use of the Windows operating system. Be sure to test the compatibility of accessibility programs, applications, and devices with the Windows operating system to verify that drivers are compatible with Windows 2000.

## Microsoft Active Accessibility

The Active Accessibility application programming interface is built into the Windows operating system. Based on OLE and COM, it allows accessibility aids to work with user interface elements. For the user, Active Accessibility is invisible. This technology facilitates compatibility with some accessibility aids.

## Third-Party Products and Services

Microsoft works with independent manufacturers to produce compatible software and hardware for users with disabilities. One of the purposes of the Active Accessibility feature is to provide infrastructure that aids the operating system and applications in understanding each other for greater compatibility with these important devices. Using Utility Manager, which is a new feature in Windows 2000, vendors are now able to add their products for easier access.

Independent vendors—typically small companies that make specialized assistive devices—help people with disabilities to make better use of the Windows operating system. The following is a partial list of the types of devices and functionality that these independent vendors produce:

- Hardware and software tools that modify the behavior of the mouse and keyboard
- On-screen keyboards
- Programs that let users type by using a mouse or by voice activation

- Software that predicts words or phrases so that users can type more quickly and with fewer keystrokes
- Closed-captioned programs
- Alternative input devices, such as head-pointer, single-switch, eye-gaze, sip-and-puff, and voice-input devices
- Programs that enlarge or alter the color of the information on the screen
- Synthesized-speech programs or Braille-embossing printers that present the information that is on the screen

### “Certified for Windows” Logo

Hardware and software vendors throughout the industry are collaborating to bring about accessible products for all computer users. Microsoft initiated the Certified for Windows program, which now applies to Windows 2000. This program promotes accessible design and includes a set of requirements and a checklist for application developers. A major goal of the program is to ensure quality and consistency in products that work on the Windows 2000 operating system. To qualify for the Certified for Windows logo, an application must be tested by VeriTest for compliance with the Application Specification for Windows 2000.

The specification addresses such requirements as closed captioning in place of relying on sound alone to convey information; visibility of the insertion point indicator (sometimes called the caret); and the ability to control mouse and keyboard and to turn off animations. One goal of this collaborative effort is to ensure quality and consistency in assistive devices for users with disabilities.

For more information about the Certified for Windows program, including application specifications, see the Application Specification Download link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

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**Important** Most third-party accessibility aids are compatible with specific versions of an operating system. Some add-on utilities can be intrusive in that they depend on file formats and programming interfaces to interpret data accurately to the user. Such dependencies change with each new operating system. Therefore, before you decide to upgrade, it is important to take inventory and perform compatibility testing with the new operating system and the applications you plan to use. For more information about emerging technologies and compatibility, see the Microsoft Accessibility link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

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## Using SerialKeys for Add-on Hardware and Software

The SerialKeys feature allows you to attach third-party assistive devices to the computer's serial port. For example, you can connect alternative keyboards or augmentative communication devices to the personal computer's serial port. The SerialKeys feature is designed for people who are unable to use standard UI methods. However, SerialKeys also allows an augmentative device to work with the local keyboard and mouse.

## Customizing the Computer for Accessibility Options

Windows 2000 installs accessibility options automatically. Moreover, users cannot delete accessibility options from the operating system after they are installed, including those options available in the Accessibility Wizard or Control Panel. In addition to new features, the Setup program retains the features that are installed by default when you upgrade from earlier versions of Windows. You can also install accessibility features on computers that are shared, such as public or workgroup servers.

## Remote Installation and Unattended Setup from a CD

Using the Client Installation Wizard, you can remotely set up client computers if the computer supports remote installation. You can use Group Policy to control the installation options that you offer to users. There are four installation options:

Automatic Setup, Custom Setup, Restart a Previous Setup Attempt, and Maintenance and Troubleshooting.

**Automatic Setup** In Automatic Setup, the default option, Windows 2000 Remote Installation Services, uses unattended installation templates so that you can create options in the categories of operating system images. Using an unattended installation setup answer file, you can create several installation options, select items to be installed, and configure specific client computer options.

**Custom Setup** Using the Custom Setup option, you can specify the computer name and Active Directory container in which you create the computer account object. This option also makes it possible to set up a computer for individual users within a group and to set up a client computer account in Active Directory before delivery of the computer to the user.

**Restart a Previous Setup Attempt** This option restarts a previous or failed setup attempt. For example, if installation of the operating system image is started and connectivity to the Remote Installation Service server is interrupted, you can do the following to resume the installation: Restart the client computer; press F12 when prompted for a network service boot; and click **Restart a Previous Setup Attempt**.

**Maintenance and Troubleshooting** The Maintenance and Troubleshooting feature gives administrators access to diagnostic utilities and other maintenance tools that are needed to maintain and troubleshoot client computers.

## Windows Installer

A technology that installs, maintains, and removes software on client computers, Windows Installer displays self-repairing applications. If a user tries to delete a file, Windows Installer reinstates the missing files the next time the user tries to open them. For more information about Windows Installer, see the Windows Platform Software Development Kit (SDK) link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

## Group Policy

Group Policy is the network administrator's primary tool for managing groups of users and computers. The administrator can use the Microsoft® Management Console (MMC) Group Policy snap-in to specify managed desktop administrative and security options for groups of computers and users. Microsoft® Windows® 2000 Server includes more than 200 default settings for Group Policy. You can specify user installation options and permit or deny user access to specified choices by using the Client Installation Wizard. Group Policy is important to enterprises that have users with disabilities because you can use it to customize settings for groups of users who have the same assistive needs. Also, multiple users of the same computer can use their logon and password information to set their own desktop preferences, including certain accessibility options.

For more information about using Group Policy, see "Group Policy" in the *Microsoft® Windows® 2000 Server Resource Kit Distributed Systems Guide*.

## Setting Multiple User Profiles

You can use the Accessibility Wizard to set multiple user profiles. The next user to log on to Windows can change the settings without deleting the previous settings. Individual settings are restored the next time a user logs on. This feature lets users or administrators set the user's preferences. Windows automatically presets features to default for other users. When accessibility features are turned off, users who do not need them do not notice that the features are installed; hence, people who require assistance, as well as those who do not, can use the computer. Multiple users of the same computer can use their logon and password information to set preferences and desktop settings, including any needed accessibility features.

## Administrative Options

You can set administrative options for several features by using Accessibility Wizard or Control Panel. Settings that you can make in both include Set Automatic Time-outs/Automatic Reset, and Default Accessibility Settings. However, you must use the Accessibility Wizard if you want to save settings to a file to be used on another computer.

### Accessibility Reset (Time-out)

Another useful feature for computers that multiple users share is the Accessibility Reset time-out feature. This component of both the Accessibility Wizard and Control Panel turns off accessibility functionality after the computer has been idle for a specified period of time. It then returns the operating system to its default configuration.

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**Note** The Automatic Reset (time-out) feature does not turn off the SerialKeys feature.

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### Active Desktop

With Active Desktop, the user can personalize nearly everything on the desktop, in addition to displaying intranet and Internet content. Windows 2000 Explorer lets the user navigate through desktop elements, such as taskbar icons, files and shortcut icons, and other objects that are on the network. This feature gives a consistent interface on all categories of objects and for some users, can be an easier way to navigate to objects on the desktop than to use the mouse.

#### Customizing the Desktop

Here are examples of ways that users can customize their desktop with Active Desktop:

- Add Web pages containing active content to a desktop.
- Put a toolbar in a handier place on a desktop or taskbar.
- Rearrange frequently opened files and programs for quick access.
- Add an address bar to the taskbar or the desktop. This addition gives users the ability to type an Internet address without opening the browser first.

#### Desktop Toolbars

Users can create their own desktop toolbars with commands they frequently use. This is most useful for people who prefer to use the mouse rather than the keyboard; users who prefer the keyboard usually want to add commands to their Start menu.

## System Status Icons

The ability to tab to the status icons on the system status area of the taskbar (sometimes called the system tray) is new in Windows 2000. When a user activates status icons for certain commonly used accessibility features, they appear in the system status area. Additionally, when the user presses a keyboard shortcut, an icon fills in the corresponding rectangle to show which key is activated. These status icons replace the status indicator of earlier versions of Windows.

## Utility Manager

New in Windows 2000, Utility Manager brings time-saving value to users. An administrator can designate which computers automatically open accessibility tools when Windows 2000 starts. Then users can stop or restart the tools to suit their needs. Immediate access to such features as Narrator, Magnifier, or On-Screen Keyboard is important to some users.

Users and administrators can also use Utility Manager to customize most of the accessibility programs available on the computer. Administrators can open a dialog box and view what Windows 2000 accessibility tools are installed and the status of the tools. Administrators can also set up additional applications or run programs that install an add-on device. Although you can open Utility Manager through the Start menu, a quicker way to open it is by using the following shortcut keys:

WINDOWS LOGO+U.

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**Note** The built-in programs that you can open from the Utility Manager are Magnifier, Narrator, and On-Screen Keyboard. In addition to applications that Microsoft has built into the operating system, third-party vendors can add applications to Utility Manager.

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For more information about adding augmentative devices to Utility Manager, refer to the documentation for the specific third-party utility.

## Configuring Accessibility Features in Windows 2000

Creating custom interfaces lets users with disabilities control their computing environment so that they can succeed in using the software they need to perform their work. Depending on each person's specific needs, users might find challenges with different aspects of Windows. Although accessibility features install automatically with Windows 2000, in a complete installation, previously configured options and settings must be reconfigured and new customized options must be configured for individual users.

Table E.1 describes some of the user aids that are built into the Windows 2000 operating system to make it more accessible. Because some features can apply to several disabilities, they are listed by particular difficulty, instead of by category of disability. For descriptions of features by category of disability, see the section “Setting Options by Type of Disability” later in this chapter.

**Table E.1 Common User Difficulties and Their Solutions**

User has difficulty...	Windows 2000 solutions
Customizing settings in a multiple-user network.	Accessibility Wizard, Administrative Options, Accessibility Options in Control Panel
Doing the following: <ul style="list-style-type: none"> <li>• Opening Windows or applications.</li> <li>• Navigating through desktop elements and Windows.</li> <li>• Customizing keyboard settings.</li> <li>• Customizing display settings.</li> </ul>	Hot keys, Utility Manager, Narrator, On-Screen Keyboard, Active Desktop, keyboard shortcuts, system status icons
Remembering what accessibility features are activated.	Accessibility Options in Control Panel
Finding a needed feature.	Accessibility Wizard for listing by disability
Remembering keyboard navigation indicators.	Accessibility Options and Display in Control Panel, Accessibility Wizard
Spelling words correctly.	Automatic Spell Checker, AutoComplete feature, AutoCorrect feature, keyboard shortcuts
Hearing, such as in the following situations: <ul style="list-style-type: none"> <li>• Hearing sound prompts.</li> <li>• Distinguishing sounds.</li> <li>• Hearing audible cues.</li> <li>• Working in a noisy environment.</li> </ul>	ShowSounds, SoundSentry, customizable sound schemes
Using standard keyboard configurations.	Dvorak keyboards, On-Screen Keyboard, MouseKeys
Using the keyboard due to slow response time.	RepeatKeys and keyboard options
Using the keyboard due to inadvertent hitting or bouncing off keys.	SlowKeys, BounceKeys, RepeatKeys, and ToggleKeys
Holding down two keys at the same time.	StickyKeys

(continued)

**Table E.1 Common User Difficulties and Their Solutions** (*continued*)

User has difficulty...	Windows 2000 solutions
Using standard user interface methods, including a mouse and keyboard.	Third-party voice-input utilities, Narrator, On-Screen Keyboard
Manipulating a mouse.	MouseKeys
Working with flashing events and other schemes that trigger seizures.	Accessibility Options in Control Panel, which allows the user to change timing, sound schemes, and color and contrast; and the Accessibility Wizard
Seeing or following the mouse pointer.	Mouse options in the Accessibility Wizard or Control Panel
Seeing keyboard status lights.	ToggleKeys
Seeing screen elements.	Narrator, Magnifier, Control Panel, and size, color, and contrast schemes in Accessibility Wizard
Functioning well with built-in accessibility features (needs add-on devices).	Active Accessibility, SerialKeys for third-party assistive devices
Finding third-party assistive devices and other accessibility information.	Microsoft Accessibility Web site (see the "Additional Resources" section in this appendix for details)

Users and administrators can use Accessibility Options in Control Panel to customize many of the accessibility features in Windows 2000. However, you can now configure many popular accessibility features using the Accessibility Wizard. For example, you can customize display, keyboard, mouse, and sound operation for the user's own particular needs by using either Control Panel or the Accessibility Wizard. The two ways to configure options are described in the following subsections.

## Configuring Accessibility Options by Using the Accessibility Wizard

New in Windows 2000, the Accessibility Wizard makes it easier to set up accessibility preferences by particular needs a user might have, instead of by numeric value changes or by Control Panel settings. Available from the Start menu, the wizard provides a single entry point for many frequently used features. The user can also save settings to a file to configure other computers. Some options the wizard controls are sound and screen options, such as volume and font sizes; several keyboard options, such as keyboard filters and MouseKeys; and the ability to set administrative options.

## Configuring Accessibility Options by Using Control Panel

The Accessibility Options icon in Control Panel allows users to easily customize properties that give users control of many of the accessibility features in Windows 2000. Users can turn the accessibility features on or off and can customize keyboard, sound, and mouse operations for the user's particular needs. Accessibility Options gives users access to the following features: StickyKeys, FilterKeys, ToggleKeys, SoundSentry, ShowSounds, MouseKeys, and SerialKeys. In addition to the options for users with disabilities in Accessibility Options, Control Panel offers other ways to modify settings in a client computer. Users can modify settings in Display, Keyboard, Mouse, Sounds and Multimedia, and others. The following sections describe many other features as well as features designed specifically for users with disabilities.

### Setting Options by Type of Disability

Creating custom interfaces gives users with disabilities control of their computing environment so that they can succeed in their work. A simplified user interface is a necessity for reducing the amount of navigation. The following are features and techniques in Windows 2000 that users and administrators can customize to suit their specific needs and preferences. Although many of these options might apply to the needs of more than one category of disability, for organization purposes, they are placed into groups by category of disability.

### Options for Users with Cognitive Disabilities

Cognitive disabilities include developmental disabilities, such as Down syndrome; learning disabilities, such as dyslexia, language unfamiliarity, illiteracy, attention deficit disorder, and memory loss; and perceptual difficulties, such as slow response time. In addition to third-party assistive devices, for example, voice input utilities, some Windows built-in features can be especially helpful to people with cognitive disabilities. Examples are the IntelliSense® features, such as AutoCorrect, AutoComplete, and Automatic Spell Checking.

You can customize AutoComplete to include only the information that users need. For some users, these features facilitate their work considerably. However, for other users, with some features—such as AutoComplete or certain sound schemes—it is advantageous for users with cognitive disabilities to clear, rather than to select these options. Such features can cause distractions, especially if the user is working with a text-to-speech utility.

Several Windows 2000 accessibility features found in the Accessibility Wizard or Control Panel can be useful to people with cognitive disabilities. Users who are familiar with Windows NT version 4.0 or earlier need to know that special keyboard filters have been rearranged in Windows 2000. Both the Accessibility Wizard and Control Panel now allow users to adjust keyboard response time to ignore accidental pressing of keys and slow response time.

Keyboard options useful to people with cognitive disabilities are hot keys and other keyboard shortcuts. Additionally, the following features are also useful to people with cognitive disabilities: Narrator; Active Desktop; system status icons that show which features are activated; and sound options found in the Accessibility Wizard and Control Panel. Also, sound schemes can help draw attention to, or provide additional feedback for, tasks as the user does them.

### **Synchronized Accessible Media Interchange**

Users with language-related difficulties might find Microsoft Synchronized Accessible Media Interchange (SAMI) useful to better understand speech through text captions. This Windows 2000 feature is described in the section “Options for Users with Hearing Impairments” later in this appendix.

## **Options for Users with Hearing Impairments**

Users who are deaf or hard-of-hearing or who have limited ability to distinguish sounds might find the following options useful. These features incorporate sound scheme adjustments or visual media as substitutes for sound.

### **Customizable Sound Schemes**

Users who are hard-of-hearing or who work in a noisy environment can adjust the pitch and timbre of sounds, as well as the volume associated with various on-screen events to make them easier to distinguish. The sounds are customizable either through the Accessibility Wizard or through Control Panel.

Windows provides sounds that users can associate with many events. These can be events that Windows or programs generate. If users have difficulty distinguishing between the default sounds, such as the beep to signal an inoperative keystroke, they can choose a new sound scheme, or design their own to make the sounds easier to identify. In Windows 2000, users can turn off the default downloading of sound files.

## Adjusting the Volume

If the computer has a sound card, users can adjust the volume for all of the Windows sounds by using the Sounds and Multimedia icon in Control Panel. They can also adjust the sound volume by using the speaker icon on the taskbar or by using Volume Control.

Some users require visual feedback instead of sound. Users who are deaf might rely on sign language as their primary language and English as their second language. They might have difficulty reading pages that use custom fonts; that depart from typographical convention, such as mixing uppercase and lowercase letters; or that use animated text displays. In such instances, users are likely to benefit from customizable sounds and closed captioning.

The following Windows 2000 features are useful to people who are deaf or hard-of-hearing.

## ShowSounds

ShowSounds, a feature in Control Panel, instructs applications that have closed captioning to display visual feedback in the form of closed captioning. In Windows 2000, users can choose to display closed captioning.

## SoundSentry

In Windows 2000, the SoundSentry feature supports only those sounds that the computer's internal speaker generates; it cannot detect sounds made by a multimedia sound card. If the computer has a multimedia sound card, the user or administrator might need to turn off this hardware to force the computer's built-in speaker to play the sounds. In this way, SoundSentry can detect these sound events. The user needs to restart Windows for this change to take effect.

## Synchronized Accessible Media Interchange

Use Microsoft Synchronized Accessible Media Interchange (SAMI)/Direct Show for closed captioning. SAMI is a format that developers, educators, and Web authors can use to create captions and audio descriptions in a single document. SAMI is based on HTML to provide a familiar, readable format. With SAMI, developers and others can create closed-captioned multimedia products. The Windows Media Player on the desktop synchronizes the captioning information for the user, who can then adjust captions to suit individual needs.

For more information about SAMI, see the Microsoft Accessibility link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

## Options for Users with Physical Disabilities

Some users are unable to perform certain manual tasks, such as using a mouse or typing two keys at the same time. Other users tend to hit multiple keys or bounce fingers off keys. Physical disabilities or mobility impairments include paralysis, repetitive stress injuries, cerebral palsy, erratic motion tremors, quadriplegia, or lack of limbs or fingers. Many users need keyboards and mouse functions adapted to their particular needs, or they rely exclusively on an alternative input device. Fortunately, a large number of input devices are available to users, including voice input utilities to control the computer with the user's voice and keyboard filters, on-screen keyboards, smaller and larger keyboards, eye-gaze pointing devices, and sip-and-puff systems that the user can operate by breath control. For more information about assistive devices and for a catalog of third-party accessibility devices, see the Microsoft Accessibility link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

### Keyboard Options

Impaired dexterity can make it difficult for a person to use a standard keyboard; however, keyboard filters built into Windows 2000 compensate somewhat by correcting for erratic motion tremors, slow response time, and similar conditions. Other kinds of keyboard filters include typing aids, such as word prediction and abbreviation expansion tools and add-on spelling checkers. The following sections describe input devices and features that vary from the standard keyboard. These features carry options that adapt the behavior of the keys to specific accessibility needs.

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**Note** In most cases, it is not possible to apply the same keyboard behavior corrections to pointing devices, such as the mouse. This limitation restricts users with impaired dexterity to keyboard input.

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### On-Screen Keyboard

Some users have difficulty with both mouse and keyboard. However, they might be able to use an on-screen keyboard with another input method, such as a pointing device, a joystick connecting to the serial port, or the keyboard space bar used as a switch device. An on-screen keyboard is a utility that lets users select keys by using an alternative input mode. Users who can point but not click can use pointing devices, switches, or Morse-code input systems.

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**Note** You need custom patch cables to operate in switch mode.

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Users can set up and customize the Windows 2000 On-Screen Keyboard through the Start menu. The On-Screen Keyboard provides a minimum level of functionality for users with moderate mobility impairments. Many users with physical disabilities need a utility program with higher functionality for daily use. For more information about Windows-based on-screen keyboards, see the Microsoft Accessibility link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

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**Note** The On-Screen Keyboard is meant to be used as a temporary solution and not as a day-to-day alternative keyboard in place of a third-party on-screen keyboard.

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### Dvorak Keyboard

The Dvorak keyboard makes the most frequently typed characters on a keyboard more accessible to people who have difficulty typing on the standard QWERTY layout. There are three Dvorak layouts: one for people who use two hands to type, one for people who type with their left hand only, and one for people who type with their right hand only. Dvorak layouts reduce the degree of motion required to type common English text. This might help avoid some kinds of repetitive strain injuries associated with typing. You can either add the Dvorak keyboard as part of the Setup program or add it later. To configure the Dvorak keyboard, use the Keyboard icon in Control Panel.

### Keyboard Shortcuts

Keyboard shortcuts are of paramount importance to users with disabilities. They are immeasurably valuable to users in nearly all categories of disabilities. These ALT commands and CTRL keys can help the user navigate through Windows 2000 more easily. Even without configuring accessibility features, the user can use the TAB key in dialog boxes to move the focus and then use the arrow keys to select items in a list. In property sheets that have multiple tabs, the user can select each property sheet in order from left to right. In Active Desktop, the user can add shortcut keys to the Start menu.

For more information about keyboard shortcuts, including shortcut keys, see Windows 2000 Help.

For more information about keyboard shortcuts, including an extensive list of accessibility keyboard shortcuts, see “Appendix H – Accessibility” in the *Microsoft Windows 98 Resource Kit*.

For more information about keyboard-only commands, accessibility shortcuts, and Microsoft® Natural® Keyboard keys, see the Microsoft Accessibility link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

## Hot Keys for Accessibility Features

Accessibility hot keys provide an immediate method of activating accessibility features for people who cannot use the computer without first having accessibility features in effect. A type of shortcut, hot keys let the user turn on a specific feature temporarily. Then, after a feature has been turned on, users can use the Accessibility Wizard or Accessibility Options in Control Panel to adjust the feature to individual preferences or to turn the feature on permanently. The same hot key temporarily turns off the feature if it gets in the way or if another person wants to use the computer without this feature.

Hot keys are designed to be unique key combinations that should not conflict with keys that programs use. If such a conflict does arise, the user can turn the hot keys off and still use the feature as needed. In a typical installation of Windows 2000, the accessibility hot keys are inactive to prevent them from conflicting with other programs.

## StickyKeys for One-Finger or Mouthstick Typing

Many software programs require the user to press two or three keys at a time. For people who type using a single finger or a mouthstick, that is not possible. StickyKeys lets the user press one key at a time and instructs Windows to respond as if the keys are pressed simultaneously.

For shared computers, there is an optional feature to keep other users from being confused when StickyKeys is left on. If the option **Turn StickyKeys Off If Two Keys Are Pressed at Once** is activated, StickyKeys detects that two keys are held down simultaneously and automatically turns the StickyKeys feature off.

Some people do not like to have keyboard sounds, while others find them useful.

Users can turn feedback sounds on or off in the StickyKeys properties by selecting the option **Make Sounds When Modifier Key Is Pressed**.

## FilterKeys for Users with Impaired Manual Dexterity

Windows 2000 includes keyboard filters that work separately or combined to make input easier for users who have difficulty with the keyboard due to slow response time, erratic motion tremors, or a tendency to inadvertently hit or bounce off the keys. With the FilterKeys feature, users can adjust keyboard response time, and allow accidental pressing of keys and slow response time.

## ToggleKeys for Users Who Inadvertently Brush Against the Lock Keys

ToggleKeys instructs Windows to play a high or low beep when the lock keys NUM LOCK, CAPS LOCK, or SCROLL LOCK are activated. This sound signals the user that one of these keys has been activated.

## Mouse Options

Users with mobility impairments can now choose among options for size, color, and animation schemes. With the Mouse icon in Control Panel, users can adjust mouse properties to increase the pointer's visibility. This customizable feature, although not specifically for users with disabilities, is useful to users with visual impairment.

### Adjusting Mouse Properties

With the Mouse icon in Control Panel, users can make the mouse pointer automatically move to the default buttons, such as OK or Apply, in dialog boxes, and can reverse the buttons so that the right button is the primary button. Users can also adjust other mouse settings, such as pointer rate of speed and acceleration; left-right orientation; and cursor size, color, shape, time between clicks, and animation. By selecting **I am blind or have difficulty seeing things on screen** and **I have difficulty using the keyboard or mouse**, users can set several accessibility Mouse options in the Accessibility Wizard.

### MouseKeys for Keyboard-Only Input

Although Windows 2000 is designed so that users can perform all actions without a mouse, some programs might still require one, and a mouse might be more convenient for some tasks. MouseKeys in Control Panel is also useful for graphic artists and others who need to position the pointer with great accuracy. A user does not need to have a mouse to use this feature. With MouseKeys, users can control the mouse pointer with one finger, a mouthstick, or a headpointer by using the numeric keypad to move the mouse pointer. With this method, users can click, double-click, and move objects with both mouse buttons. When MouseKeys is activated, it emits a rising tone if sounds are turned on.

## Options for Users with Seizure Sensitivity

To accommodate users with seizure disorders, including those with epilepsy, users can adjust screen elements, such as timing, color and contrast, and sound by using Accessibility Wizard or Control Panel in Windows. The range and selection in many of these features are expanded in Windows 2000. Users can also limit the number of fonts to one or more specified favorites. The following accessibility features can be customized for people with seizure disorders.

## Timing Patterns

Timing patterns can affect users in many adverse ways. Users with seizure disorders, such as epilepsy, can be sensitive to screen refresh rates and blinking or flashing images. Settings in Windows 2000 Control Panel can prevent the default loading of animations and videos. Users can adjust the rate at which most objects flash to select a frequency that is less likely to trigger seizures. Users or administrators can alter the insertion point indicator (sometimes called the caret) blink rate, and can link it to flashing events for users who are sensitive to screen refresh rates. They can turn off blinking or flashing images.

## Sound Schemes

In addition to users with hearing impairments or users in crowded or noisy environments, users with seizure sensitivity can also be susceptible to specific sounds. Settings in Windows 2000 can prevent the default loading of animations, videos, and sounds. Using Windows Control Panel, users can also assign custom sounds to any event. The ability to customize sound schemes, whether to turn sound on or off, or to adjust volume up or down, is becoming more important for users and takes many forms in Windows 2000 in support of people with various kinds of disabilities and requirements.

## Color and Contrast Settings

Through Accessibility Options in Control Panel and Magnifier, users can adjust color and contrast settings. New to Windows 2000 is an expanded spectrum of color schemes, customizable to suit a user's individual needs. For more detailed information, see the following section on visual impairments.

## Options for Users with Visual Impairments

The following accessibility features are useful to people who are blind or have low vision, colorblindness, tunnel vision, or other visual impairments: text-to-speech utilities, such as Narrator; keyboard shortcuts; Magnifier; and customizable features such as mouse pointer, color and contrast schemes, and other user interface elements.

## Microsoft Narrator

Narrator is a minimally featured text-to-speech program included with the U.S. English version of Windows 2000. This new feature works through Active Accessibility to read objects on the screen, their properties, and their spatial relationships. Narrator has a number of options that let users customize the way a device reads screen elements. The Voice option lets users adjust the speed, volume, or pitch of the voice. The Reading option lets them select the typed characters they want the device to read aloud, such as Delete, Enter, printable characters, or modifiers. The Mouse Pointer option causes the mouse pointer to follow the active item on the screen. The **Announce events on screen** option lets users order the device to announce any of the following components when it displays them: new windows, menus, or shortcut menus. Narrator provides a minimum level of functionality for users with moderate visual impairments. Many users with low vision need a text-to-speech utility program with higher functionality for daily use. For more information about other Windows-based text-to-speech utilities, see the Microsoft Accessibility link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

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**Note** Narrator is a temporary aid and is not intended as a replacement for the full-featured text-to-speech utilities available from other software companies.

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## Keyboard Audio Cues

ToggleKeys is especially useful for people who accidentally press the CAPS LOCK key instead of the TAB key because it provides immediate feedback when they do so. ToggleKeys also functions with keyboards that do not have the status indicator lights for the CAPS LOCK, NUM LOCK, and SCROLL LOCK style of keyboard.

## Microsoft Magnifier

Magnifier is a limited-function screen enlarger that magnifies a portion of the display of Windows 2000 to make the screen easier to read for people with slight visual impairments or whenever magnifying screen elements might be useful, such as during graphic editing. Magnifier displays an enlarged portion of the screen in a separate window. When Magnifier is on, the magnified area is merely a display and is not an active area. Magnifier provides a minimum level of functionality for users with moderate visual impairments. Many users with low vision need a magnification utility program with higher functionality for daily use. For more information about other Windows-based magnification utilities, see the Microsoft Accessibility link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.

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**Note**

Magnifier is not a replacement for the full-featured magnifiers available from other software companies.

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**Fonts**

To select fonts, users click the Fonts icon in Control Panel to remove the fonts that they do not want to use. If they remove all TrueType customizable fonts and leave only raster fonts, users can also restrict the sizes that they use. TrueType fonts are device-independent fonts that are stored as outlines and that can be scaled to produce characters in varying sizes. Raster fonts are created with a printer language based on bitmap images. Removing fonts does not delete them from the hard drive, so users can easily reinstall the fonts for later use.

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**Note** Limiting fonts in Control Panel also limits the number of fonts available to applications. This operation affects the display of documents on the screen and how they are printed; therefore, users need to use caution when limiting fonts.

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**Size and Color Schemes**

In the Accessibility Wizard and also in Control Panel, users can adjust the size and color of most screen elements, such as window text, menus, insertion point indicator (also called a caret), mouse cursor, fonts, and caption bars. This capability can make the system easier to use and can reduce eyestrain. In the Accessibility Wizard, users can change icon size, mouse pointer size, and text size. In Control Panel, users can change the border width of windows. They can also change text sizes in Windows messages and in command prompt windows by double-clicking the Display icon and then selecting the preferred scheme from the Appearance tab. Users can resize a window by using the keyboard instead of the mouse. They can also resize a window in the Accessibility Wizard by selecting **I am blind or have difficulty seeing things on the screen**. Users can change the font size in Windows messages through Accessibility Wizard or Control Panel.

Consider the following points before you adjust color settings:

- Settings that display a large number of colors require a large amount of computer processor resources.
- A High Color setting includes more than 65,000 colors. A True Color setting includes more than 16 million colors.
- The monitor and display adapter determine the maximum number of colors that can appear on the screen.
- To change settings for another monitor in a multiple-monitor system, administrators must select the **Extend My Windows Desktop onto this Monitor** check box to change the settings for the other monitor. They can make color settings for each installed monitor.

## High-Contrast Color Schemes

Customizing contrast and color can make it easier to see screen objects and can reduce eyestrain. No longer activated by Control Panel alone, the High Contrast feature is a built-in and expanded library of color schemes for users with low vision who require a high degree of contrast between foreground and background objects. For example, users who cannot easily read black text on a gray background or text drawn over a picture can benefit from this feature. Activating High Contrast mode automatically selects the user's preferred color scheme. Through the Magnifier dialog box, users can invert the colors of the magnification window or display the screen in high contrast. It can take a few seconds for High Contrast mode to take effect.

## New Mouse Pointers

Customized through the Accessibility Wizard or Control Panel, new mouse pointers let the user decide which pointer is most visible. To improve visibility, users can now set characteristics of the mouse pointer for size, color, and speed, and for animation and visible trails. Pointers now include three sizes: large, extra-large, and default. Pointer options include white, black, and an inverted pointer that reacts to screen colors. (The latter pointer changes to a color that contrasts with the background.)

## Additional Resources

- For more information about accessibility for users with disabilities, including technical support, documentation, and related organizations, see the Microsoft Accessibility link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.
- For more information about keyboard shortcuts, including an extensive list of accessibility keyboard shortcuts, see "Appendix H – Accessibility" in the *Microsoft Windows 98 Resource Kit* by Microsoft Corporation, 1998, Redmond, WA: Microsoft Press.
- For more information about accessibility for users with disabilities and for a catalog of accessibility aids, you can telephone or write Microsoft as follows:
  - Telephone Microsoft Sales Information Center at: 1 + (800) 426-9400
  - Telephone Microsoft Sales Fax Service line to receive faxed-back documents at: 1 +(800) 727-3351
  - Write Microsoft Sales Information Center at: One Microsoft Way, Redmond, WA 98052-6393