

Section 508 Technical Reference Guide

Handbook AS-508-A

September 2004
Transmittal Letter

- A. **Purpose.** Using technology to enhance value is an integral part of the Postal Service™'s Transformation Plan. As we increase our reliance on electronic information systems to help us manage information and costs, improve service, and carry out our mission more efficiently, we have an even greater responsibility to provide full access for our customers, our employees, and those with whom we do business. This handbook provides the tools to help each of us do that. All functional organizations should use the information in this handbook to understand, achieve, and maintain Section 508 compliance. By achieving the goals of this law, we fulfill our mission of binding the nation together in the 21st century.

This is a technical reference guide in support of Handbook AS-508. It breaks out the details of each of the sections of that handbook and how they are tied to the law.

- B. **Scope.** Providing access to electronic forms of Postal Service information, products, and services is both efficient and economic. The techniques in this handbook have an effect on employees, customers, suppliers, and business partners. Given the broad scope of the 508 law and its pervasive impact on information technology, collaborative efforts are needed to successfully achieve organization-wide compliance. Consequently, the audience for this handbook spans the entire corporation. Although managers of functional organizations within the Postal Service have direct responsibility for the conformance of their area, the coordinated efforts of cross-functional teams are vital to realize the mandates of the Section 508 law.
- C. **Availability.** This handbook is available online and may be accessed both from the Internet and from the Postal Service Intranet.

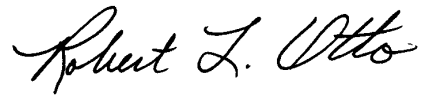
From the *usps.com* homepage, click on *All Products & Services*, then on *Publications*, then on *Postal Periodicals and Publications*. Choose *Handbooks*.

It is also available on the Postal Service PolicyNet Intranet Web site:

- Go to *http://blue.usps.gov*.
- Under "Essential Links" in the left-hand column, click on *References*.
- Under "References" in the right-hand column, *PolicyNet — Text*.
- Then click on *HBKs*.

D. Comments and Questions. Send comments via email to: section508@email.usps.com.
Use "AS-508" in header.

E. Effective Date. This handbook is effective immediately.

A handwritten signature in black ink that reads "Robert L. Otto". The signature is written in a cursive style with a large, prominent 'R' and 'O'.

Robert L. Otto
Vice President
Information Technology

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1 Introduction

1-1 Policy

The United States Postal Service™ complies with Section 508 of the Rehabilitation Act. This compliance ensures that development, procurement, maintenance, or use of electronic and information technology (EIT) enables our customers and employees with disabilities to have equivalent access to Postal Service information and interactive services comparable to that of persons without disabilities, except in the event of exceptions or undue burdens as covered by Section 508.

1-2 History of Section 508

1-2.1 Development of the Law

In 1986, Congress amended the Rehabilitation Act of 1973 to require Federal agencies and the Postal Service to make their electronic and information technology (EIT) accessible to people with disabilities. Just as public buildings must be accessible (e.g., entry and use by people in wheelchairs), information technology must be designed and created so that people with disabilities can access the content of information systems.

Congress amended Section 508 to define specific standards to make information technology accessible. These standards ensure that Postal Service employees and customers with disabilities have access to information and data.

1-2.2 **Structure of the Law: Technical Standards and Functional Performance Criteria**

Section 508 includes six technical standards with associated provisions and functional performance criteria.

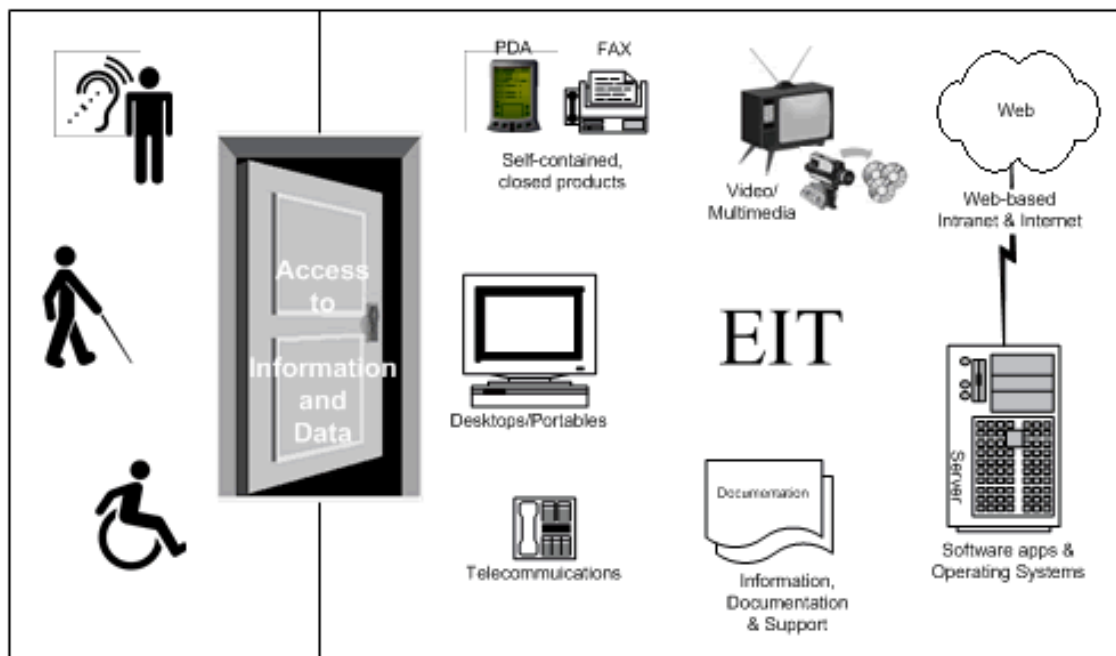
These technical standards are defined in terms of classes of technology. These standards are software applications and operating systems; Web-based intranet and internet information and applications; telecommunications products; video and multimedia products; self-contained, closed products; and desktop and portable computers. They are referred to as “assistive technology” — any item or system — whether acquired, modified, or customized — used to increase, maintain, or improve functional capabilities of people with disabilities. These technical standards translate into day-to-day business functions, such as using the Web to look up postal rates, using a kiosk to purchase stamps, receiving messages with email, and using a computer to view a presentation.

Functional performance criteria define overarching performance measures that ensure interaction across all classes of technology. The functional performance criteria ensure that from the perspective of a person with a disability, all interactions are consistent and accessible, regardless of the class of technology.

Business functions often span multiple classes of technology. When you apply Section 508, you must consider all applicable technical standards and functional performance criteria. For example an e-learning system may include Internet-based technology and video and multimedia access from a desktop, with consistent functional performance.

When we adhere to both technical standards and functional performance criteria, people with functional limitations can use all Information Technology (IT) systems.

Exhibit 1-2.2
Access to Technology and Function



Finally, when the technical standards and functional performance criteria can not be fully met, Section 508 provides for exceptions. In most cases, when an exception is taken, the law requires that we provide an alternate format or access method to information and data.

1-3 Compliance

1-3.1 Importance of Compliance

Compliance with Section 508 requirements does the following:

- a. Demonstrates our commitment to implementing business practices that make our IT based products and services accessible to our employees and customers with disabilities.
- b. Reinforces the worldwide reputation of the Postal Service as a trusted provider of communications — for all people.
- c. Enhances business opportunities.
- d. Avoids costly litigation.
- e. Improves overall usability of our information resources.

1-3.2 **Monitoring**

1-3.2.1 **Department of Justice**

The Department of Justice monitors Federal agency and Postal Service compliance with Section 508 requirements.

1-3.2.2 **Postal Service**

As directed by the Postmaster General, the Chief Technology Officer leads the Postal Service's compliance effort through the institutionalization of Section 508 policy, procedures, and requirements related to electronic and information technology.

The Information Technology Organization conducts limited oversight monitoring of corporate-wide Section 508 compliance, with a focus on capturing information for reporting purposes.

1-3.2.3 **Functional Organizations**

For all phases of the EIT life cycle, compliance monitoring resides with the responsible functional organization. The functional organizations have this responsibility for both purchased and Postal developed EIT.

1-4 **Scope**

1-4.1 **Postal Service Employees**

This handbook applies to Postal Service functional organizations and personnel who do the following:

- a. Have job responsibilities that relate to any aspect of Postal Service electronic and information technology systems.
- b. Determine or maintain policies related to Section 508, i.e., internal or external complaints and their processing.
- c. Promote Postal Service information technology based products and services.

1-4.2 **Suppliers**

This handbook also applies to suppliers, contractors, and business partners, throughout the IT life cycle, including the design, supply, and development phases of Postal Service electronic and information technology.

1-4.3 **Enterprise Architecture and Information Infrastructure**

This handbook applies to the entire Postal Service enterprise architecture, which provides the framework for our business solutions and supports our information technology infrastructure. The *Information technology infrastructure* includes both the information (text and data) and the technology used to present them.

1-5 **About This Handbook**

1-5.1 **Generally Speaking**

The purpose of this handbook is to help you understand and implement the accessibility guidelines. In the absence of explicit Postal Service direction related to a general requirement or technical standard of the law, use the law, itself. Software purchased or created after June 21, 2001, is as compliant with Section 508 standards as possible.

This handbook helps you:

- Gain a better understanding of the general requirements of Section 508.
- Know the specific technical requirements of the six EIT standards and related provisions.
- Know how they translate into Postal Service requirements.

Federal agencies, industry, and the general public interested in Section 508 activities may also find this book useful.

1-5.2 **Introductory Chapters (1–4)**

These chapters provide information about Postal Service policy roles and responsibilities, a “snapshot” view of the requirements of Section 508, and information on using this handbook.

1-5.3 **Technical Chapters (5–11)**

Here you will find Postal Service requirements to implement the technical standards contained in Section 508. Each chapter contains the legal provisions and the following sections:

- **Rationale.** Describes how the technical area addressed by the provision affects certain people with disabilities, including those who use certain classes of assistive technologies (AT).
- **Requirements.** Requirements are not tied to a product or supplier-specific technologies or standards. They:
 - Contain a core statement (and optionally, exhibits) related to an accepted design practice or alternate method that must be used when it applies to the EIT in question.

- Can be used to evaluate how particular EIT conforms to the Postal Service Section 508 requirements or to develop solutions that conform.
- **Testing.** Testing methods validate that performance matches expected results. Testing provides processes for evaluating and documenting accessibility compliance. For purchased software, it verifies that the product performs as stated. For prototypes, it evaluates how well innovative functionality satisfies user requirements. For internally developed software, it may find errors that need correction. In all cases, testing can validate compliance with the standards.
- **References.** Provides information related to specific requirements.

1-6 Additional Sources for Accessibility

When evaluating the requirements of the law, the Postal Service accepts the published Federal Law or other information officially published by the Access Board <http://www.access-board.gov/508.htm>. Additional publications that reinforce the Postal Service's institutionalization of accessibility considerations include the following:

- a. Handbook EL-307, *Reasonable Accommodation, an Interactive Process*.
<http://www.usps.com/cpim/ftp/hand/el307/welcome.htm>
- b. Handbook AS-885, *usps.com Development Process & Standards*.
<http://blue.usps.gov/cpim/ftp/hand/as885/welcome.htm>
- c. Management Instruction AS-885-2004-15, *Managing Web Sites on the Corporate Intranet*.
<http://blue.usps.gov/cpim/ftp/manage/a8850215/welcome.htm>
- d. 39 CFR 255, *Access of Persons with Disabilities to Postal Service Programs, Activities, Facilities, and Electronic and Information Technology*.
http://www.access.gpo.gov/nara/cfr/waisidx_03/39cfr255_03.html
- e. *Purchasing Manual*
<http://www.usps.com/cpim/ftp/manuals/pm3/html/welcome.htm>
- f. USPS Integrated Solutions Methodology.
http://ism.usps.gov/pls/ismprodnp/page?psite_id=4&pnode_id=1
- g. U.S. Department of Justice: A Guide to Disability Rights Laws
<http://www.usdoj.gov/crt/ada/cguide.htm>

2 Roles and Responsibilities

This chapter describes the Postal Service roles and responsibilities related to complying with Section 508 legal requirements.

2-1 Vice President/Chief Technology Officer

As designated by the Postmaster General, The Vice President/Chief Technology Officer (VP/CTO) leads the Postal Service Section 508 effort. The VP/CTO does the following:

- a. Establishes a Postal Service information technology infrastructure that both responds to corporate business needs and enables compliance with requirements related to Section 508.
- b. Provides Postal Service technology and development standards for the design, development, use, and maintenance of Section 508 compliant information technology systems.
- c. Identifies and assigns the organizational roles and responsibilities necessary to ensure Postal Service compliance with Section 508.
- d. Designates a Section 508 Program Manager to lead the corporate-wide Section 508 initiative.

2-2 Section 508 Program Manager, Information Technology

The Section 508 Program Manager, as designated by the VP/CTO, does the following:

- a. Coordinates overall activities undertaken by the Postal Service in guiding our response to Section 508.
- b. Develops and disseminates Postal Service policies, procedures and requirements, related to achieving implementation of, compliance with, and *institutionalization* of Section 508.
- c. Provides high-level technical guidance on the Electronic Information Technology (EIT) accessibility standards.

- d. Identifies functional organization stewardships that correspond to the following Section 508 technical specification standards in the following products and services areas:
 - (1) Software applications and operating systems.
 - (2) Web-based intranet and Internet information and applications.
 - (3) Telecommunications.
 - (4) Video and multimedia.
 - (5) Self-contained, closed products.
 - (6) Desktop and portable computers.
- e. Identifies functional organization stewardships that correspond to the non-technical specifications of the law and standards for the following areas:
 - (1) Purchasing.
 - (2) Consumer complaints.
 - (3) Employee complaints.
 - (4) Legal guidance.
- f. Prepares and provides the Postal Service's input to the U.S. Department of Justice for inclusion in the Attorney General's biennial government-wide accessibility report to the President. Prepares other reports as required by the Department of Justice.
- g. Identifies an agency Section 508 coordinator and backup coordinator and provides this information to the Architectural and Transportation Barriers Compliance Board (hereafter, "Access Board") and General Services Administration (GSA) Section 508 Interagency Program.
- h. Serves as the Postal Service liaison to the Access Board and GSA Interagency Program.
- i. Directs the Section 508 Program Team by doing the following:
 - (1) Managing the day-to-day program activities.
 - (2) Addressing the varying demands of the program.
 - (3) Establishing program objectives.
 - (4) Facilitating coordination of stewardships across the Postal Service in the following areas:
 - (a) Standards definitions and integration.
 - (b) Evaluation processes.
 - (c) Training for all audiences.
 - (5) Providing a framework for communication vehicles: handbook, brochures, videos.
 - (6) Creating and conducting education and awareness throughout the agency.
 - (7) Reporting program status to senior management.
- j. Coordinates and implements processes resulting in the institutionalization of Section 508.

2-3 Section 508 Technical Stewards

The VP/CTO designates a Technical Steward for each of the six EIT accessibility standards. (see <http://cto.usps.gov>, click on *Support, Standards & Guidelines, 508 Standards and Support*). Technical Stewards and their associated EIT technical standards are listed in exhibit 2-3. Technical Stewards do the following for their respective EIT standard(s):

- a. Serve as the Postal Service technical experts.
- b. Provide technical guidance and support for the content of Postal Service Section 508 policy and technical documents to enable the Postal Service to comply with Section 508 when purchasing or developing EIT.
- c. Provide technical guidance and support to Postal organizations on their specific Section 508 standards.
- d. Establish testing and evaluation benchmarks that are in harmony with the generic testing approaches and techniques defined in this handbook.
- e. Stay abreast of changes to the technical standards and update Postal Service Section 508 policy and technical documents accordingly.
- f. Help functional organizations respond to inquiries and complaints concerning the class of technology for which they are the stewards.
- g. Create and conduct training on the technical area of their stewardship.
- h. Coordinate among stewardships to ensure that interpretations rendered by stewards are consistent, and to address issues that arise when EIT solutions are covered by more than one Section 508 standard.
- i. Promote ongoing communications and education within the Postal Service.
- j. Represent the Postal Service on interagency working groups to further understanding and consistency of technical guidance.

Exhibit 2-3

| Steward | Section 508 EIT Technical Standard |
|--|---|
| Mgr., Business Solutions Services, IT | <ul style="list-style-type: none"> ▪ Software applications and operating systems. |
| Mgr., Telecommunications., IT | <ul style="list-style-type: none"> ▪ Telecommunications products. (Includes telephony interactive voice response systems, data, and other telecommunications equipment and services.) |
| Mgr., Enabler Business Systems Portfolio | <ul style="list-style-type: none"> ▪ Video and multimedia products. (Includes related training and promotional materials.) |
| Mgr., Technology Support, IT | <ul style="list-style-type: none"> ▪ Self-contained and closed products. (Includes kiosks, copiers, printers, calculators, mail processing equipment, scanners, fax machines, point-of-sale terminals, etc.) |

| Steward | Section 508 EIT Technical Standard |
|--|---|
| Mgr. Distributed Computing Environment, IT | <ul style="list-style-type: none"> ▪ Desktop and portable computers. (Includes employee workstations and laptops.) |
| Mgr., Corporate Business Systems Solutions | <ul style="list-style-type: none"> ▪ Web-based intranet and internet information and applications. |

2-4 IT Portfolio Managers

The IT Portfolio Managers do the following:

- a. Acquire an in-depth knowledge of Section 508 requirements.
- b. Disseminate Section 508 knowledge for their area.
- c. Champion Section 508 compliance of their area.
- d. Determine how Section 508 applies to each new business function.
- e. Ensure that market research and other Integrated Systems Methodology (ISM) procedures include Section 508 considerations within the EIT life cycle.
- f. Document Section 508 compliance within their area of responsibility, including updates to the Enterprise Information Repository (EIR), Infrastructure Tool Kit (ITK), or other databases as needed.
- g. Assist Functional Organizations to document exceptions when a solution is not completely Section 508 compliant.

2-5 Vice President, Labor Relations

The Vice President, Labor Relations (LR), does the following:

- a. Provides policies and procedures on the Section 508 employee complaint process and any other labor-related areas affected by Section 508.
- b. Integrates Section 508 policies and procedures into existing labor-relations processes and documents.
- c. Creates and conducts training to affected parties to promote awareness.

2-6 Vice President, Supply Management

The Vice President, Supply Management, does the following:

- a. Provides policies and procedures on how the Postal Service purchases any products that involve compliance with Section 508 requirements.
 - (1) Creates and incorporates applicable procurement clauses into the *Purchasing Manual*.

- (2) Creates and implements processes to insure that the Postal Service follows the legal requirements for complying with exceptions and undue burden documentation.
- b. Integrates policies and procedures of Section 508 into the existing Supply Management processes and documents.
- c. Creates and conducts training for contracting officers and others involved in the purchasing process.

2-7 Vice President, General Counsel

The Vice President, General Counsel (GC), does the following:

- a. Updates legal publications and Postal Service policies and procedures in the GC area to conform with ongoing legal requirements.
- b. Provides legal guidance in response to Section 508-related inquiries from functional organizations and the Section 508 Program.
- c. Notifies affected functional organizations of updates to relevant statutes and related interpretations.

2-8 Vice President, Consumer Affairs

The Vice President, Consumer Affairs (CA), does the following:

- a. Provides policies and procedures on processing consumer complaints.
- b. Integrates policies and procedures concerning Section 508 into the existing processes and documents.
- c. In consultation with the General Counsel, updates 39 CFR 255 and any Postal Service CA policies that are affected by Section 508.
- d. Manages the response of consumer complaints.

2-9 Vice President, Public Affairs and Communications

The Vice President, Public Affairs and Communications, designates the manager of USPS TV to be responsible for the multimedia stewardship.

2-10 All Postal Service Officers

All Postal Service officers do the following:

- a. Designate a liaison to coordinate Section 508 activities within and among their respective organizations.
- b. Champion Section 508 compliance within their organizations.
- c. Fund the cost of compliance and litigation for their organizations.

- d. Authorize exception or undue burden documents for the requiring functional organization, if a solution is not completely Section 508 compliant (see section 4-6).

2-11 All Functional Organizations

Functional organizations have the responsibility and legal liability for Section 508 compliance. This ensures all products, including those a contractor develops or supplies in accordance with contract requirements, comply with Section 508. Contracts should include requirements for contractors to comply and may include contractor responsibility for testing, but acceptance of a product or service as compliant is the legal responsibility of the Postal Service.

All functional organizations that require EIT do the following:

- a. Follow the requirements of the law and of this handbook when they use, develop, procure, or maintain EIT products and services.
- b. Respond to Section 508 inquiries or complaints from the public according to 39 CFR 255, *Access of Persons with Disabilities*, regarding EIT controlled by their functional organizations.
- c. Respond to Section 508 inquiries or complaints from employees following established procedures.
- d. Provide information on the status of Section 508 EIT compliance as required.
- e. Create exception or undue burden documents for approval of their respective vice president when a solution is not completely Section 508 compliant (see section 4-6 of this handbook).

2-12 Section 508 Stewards — Liaisons for Accessibility

Section 508 stewards, as designated by their Postal Service officer, do the following:

- a. Acquire an in-depth knowledge of Section 508 requirements.
- b. Coordinate Section 508 activities within their respective organizations.
- c. Respond to reporting requirements on Section 508 compliance within their respective organizations.
- d. Stay abreast of changes to the Section 508 program.
- e. Develop an ongoing education/information awareness activity to make sure employees within their organization are aware of Section 508 program updates.

2-13 Importance of Compliance

Compliance with Section 508 requirements does the following:

- a. Demonstrates our commitment to implementing business practices that make our IT-based products and services accessible to our employees and customers with disabilities.
- b. Reinforces the worldwide reputation of the Postal Service as a trusted provider of communications — for all people.
- c. Enhances business opportunities.
- d. Avoids costly litigation.
- e. Improves the overall visibility of our information resources.

For all phases of the EIT life cycle, compliance monitoring resides with the responsible *functional organization*. The functional organizations have this responsibility for all EIT purchased or developed by the Postal Service.

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3 Section 508 — Overview of Accessibility

This chapter contains an overview of the law, its essential rationale, and brief explanations of the design of EIT with the use of assistive technology to support the needs of people with disabilities.

3-1 What the Law Covers

The Rehabilitation Act of 1973 says that federal agencies, federally funded programs and services, and federal contractors cannot discriminate based on disabilities, and that federal agency electronic and information technology (EIT) cannot discriminate in its availability and use based on disabilities.

Briefly stated, Section 508 is a law about technology. It says we must make sure our information and data are accessible to all people, specifically people with disabilities.

3-1.1 General Requirements

Generally, Section 508 says that any agency, including the Postal Service, must do the following:

- a. Buy, build, and maintain EIT so that information and data are accessible to their employees who have disabilities in a way that is comparable to the access and use provided to employees without disabilities.
- b. Ensure that access to information and data by Postal customers with disabilities is comparable to that provided to people without disabilities.

3-1.2 Overview of Standards: Classes of Technology, Classes of Disability

The provisions of Section 508 focus on making EIT accessible to people with different disabilities. Specifically, the standards describe the use of information with the disabilities of vision, hearing, and mobility.

To enable the use of information by people with disabilities, Section 508 identifies six classes of information technology (refer to chapters 5–11) and defines specific and functional requirements that enable people to interact with these technologies. For example, when using a word processor, people

without disabilities can use a mouse to highlight text, cut the text from its original position, and paste it into another location. An accessible Section 508-compliant word processor would support the same functions without any use of the mouse. As another example, when using a website, people without disabilities identify a hyperlink, and then use a mouse to click on the link to move to another page. A Web site designed with accessibility in mind would support the same functions without any use of the mouse.

3-2 Rationale

In the absence of clear requirements that specify how accessibility can be achieved, technology has often been designed so that only able-bodied people could use it. Just as a multi-level building without stairs can exclude people with mobility impairments, information technology can be a barrier too. A display of information presented in graphical form without a text equivalent is not usable by people with significant visual impairments. A video without captioning bars a deaf person from understanding the message. A copier with operational controls in the back denies a person in a wheelchair full access.

Section 508 defines technical standards for six classes of technology: software applications and operating systems, Web-based intranet and internet information and applications, telecommunications products, video and multimedia products, self-contained, closed products, and desktop and portable computers. To insure that adherence results in functional access by people with disabilities, the law also specifies performance criteria.

The law addresses both simple technologies and complex solutions. Complex systems often include components from more than one class of technology; each individual component within its class must meet its specific standard.

For example, in a bank ATM (a self-contained, closed product), where the output of the machine is displayed on a screen, an alternate format for the information is speech. Reasonable accommodation for visually impaired and blind users includes a headphone jack on the front of the ATM where the output can be heard. The instructions for use of the machine are also available in the audio format. Although headphones (a form of *assistive technology* for a visually impaired person) are not supplied by the bank, the bank has a responsibility to provide an alternate format for the information.

In a desktop computer environment the potential information displays are limitless. Therefore, the provisions of the law do not require recorded speech for each screen element – rather, what is needed is a standard (software applications and operating systems) that allows *assistive technology software* to access the text (or a text equivalent) of each screen element and present synthetic speech as an audio format.

In both examples, the goal is the same: access to information by all. However, the techniques used are specific to the class of technology.

3-3 Assistive Technologies

3-3.1 Description

Assistive technology is used in the Postal Service desktop environment to help people with disabilities access computer systems and data or information. Examples include the following:

- a. A screen reader that converts text to speech.
- b. A screen magnifier that enlarges the screen display.
- c. Speech-to-text software that converts speech to text or software commands.
- d. Keyboard alternatives such as split or natural keyboards.
- e. Shortcut keys for all mouse actions.

These types of technology are used to accommodate employees. They are also used to verify that desktop software and websites are accessible. Section 508 does not require the Postal Service or other government agencies to provide *assistive technology* to the general public but must provide **accessible information and data**. Federal agencies and the Postal Service must provide *employees* with **assistive technologies** necessary to perform their work.

3-3.2 Postal Service Standards

The Postal Service standard assistive technologies are listed in the Infrastructure Tool Kit (ITK) at <http://itk>. This list is evolving and will expand as needed. The current ITK assistive technology includes:

- a. **Screen Reader Software**
JAWS for Windows 98/95, NT, and Windows 2000
(<http://www.freedomscientific.com/>)
- b. **Screen Magnification Software**
MAGic for Windows 98/95, NT, and Windows 2000
(<http://www.freedomscientific.com/>)
- c. **Speech-to-Text Software**
Dragon NaturallySpeaking for Windows 98/95, NT, and Windows 2000
(<http://www.scansoft.com/naturallyspeaking/>)
- d. **Middleware for Speech to Text and Screen Reader Software**
JawBone for Windows 98/95, NT, and Windows 2000
(<http://www.ngtvoice.com/>)

This standardized software allows the Postal Service to determine compliance with the functional performance criteria and allows testing technical compliance using tools approved for use in the postal computing environment.

3-4 Guiding Principles

Three overarching concepts that should always be considered when applying Section 508.

3-4.1 **Integrate multiple technical standards**

When functions span technical standards (e.g., a Java application launched from a Web browser), the provisions for keyboard access, color, etc. must be as consistent as possible. Since a Java application is software, the provisions of two standards (Software Applications and Operating Systems, Web-based Intranet and Internet Information and Applications) apply. Both usability and accessibility are best achieved when user interfaces follow best practices in a consistent manner.

3-4.2 **Consider both information itself and authoring tools that create information**

For some software products, specifically development environments (e.g., Dreamweaver for websites or Eclipse as a Java development environment), there are two separate issues:

- a. Accessibility of the tool itself.
- b. Accessibility of the output that the tool generates.

For some high-end, complex tools, usage in the authoring mode may not be fully compliant, and a legitimate exception may be made. For the output of all tools (text files, HTML pages, Java applications), accessibility is mandatory.

3-4.3 **Consider all available techniques for access**

For more complex EIT solutions, Section 508 includes the following techniques to use to achieve compliance:

- a. *Assistive technology.* The use of equipment or systems, which normally reside on the user's desktop, to present text and data in a manner suitable to someone with a disability. (See section 3-3, above.)
- b. *Alternate formats.* The use of formats such as Braille, ASCII text, audio, which can be used by people with disabilities.

3-5 What is Compliance?

Compliance is defined as meeting the requirements set forth in the Section 508 Technical Standards and Functional Performance Criteria. Proposed EIT solutions may *fully comply*, *best meet*, or *not comply*, as defined below:

- a. *Fully complies*. An EIT product is *fully compliant* if the text or data it provides is accessible and usable by a person with disabilities in the manner the law requires, and meets the Section 508 EIT Technical Standards and functional performance criteria. Such compliance may or may not be enabled by the use of assistive technology or alternate formats or methods. EIT built by the Postal Service should be *fully compliant*.
- b. *Best meets compliance*. *Best meets* applies only to EIT products that the Postal Service purchases. A product *best meets* compliance requirements when it does not meet all relevant standards but is the most compliant product available at the time of purchase. In that event, the organization purchasing the product would do the following:
 - (1) Document the market research used to determine the appropriateness of the product to meet business requirements.
 - (2) Define the exception(s).
 - (3) Document that the best overall choice has been made at the present time.
- c. *Does not comply*. A product *does not comply* if it cannot achieve compliance as defined by the relevant Section 508 Technical Standards or Functional Performance Criteria.

Note: Upgrades or events may require reevaluation at which time an alternative and more compliant product might be available. See chapter 4 for guidance on how to document an exception or an undue burden.

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4 Section 508 — Postal Service Processes to Comply

This chapter describes how accessibility compliance integrates into existing Postal Service processes, focusing on two aspects of the system life cycle: the procurement process and the development process. These processes overlap; the Postal Service uses electronic and information technology (EIT) products and systems both as off-the-shelf solutions and as components of custom developed solutions. This chapter contains the following:

- A high-level overview of the steps involved in procuring and developing technology solutions that comply with Section 508.
- Two tables demonstrating how Section 508 is a fundamental part of the Postal Service Integrated Systems Methodology (ISM).
- Guidance on understanding, applying, and documenting exceptions.

4-1 Background for Purchasing Compliant EIT

This section provides policy and guidance for the creation and approval of purchasing requests for Section 508 compliant (EIT). It also includes policy and procedures to follow when a solution does not meet the technical standards and functional performance criteria for accessibility cited by Section 508 of the Rehabilitation Act.

Section 508 of the Rehabilitation Act requires that EIT purchased by the Postal Service on and after June 21, 2001, complies with the Section 508 Electronic and Information Technology Accessibility Standards (or updates). The standards were published in the *Federal Register* by the Architectural and Transportation Barriers Compliance Board (Access Board) in December 2000.

Note: For purposes of this chapter, the term EIT is equivalent to the Postal Service's use of the term information technology (IT) as defined in the *Purchasing Manual*. The law also governs the purchase of electronic products that are not generally purchased by an Information Technology department. These products are primarily closed, self-contained products such as printers, copiers, and FAX machines.

4-2 Processes to Comply With Section 508

4-2.1 Specific Standards and Functional Performance Criteria

The intent of Section 508 is to insure that the core technology infrastructure of all government agencies enables people with disabilities to access the information that is available to non-disabled citizens.

Compliance is as clearly defined as possible within the context of best practices in both electronic information technology and assistive technology. Since all technologies evolve, adherence to **only** specific provisions of each applicable technical standard may not result in full compliance with the law.

To address this problem, the law includes §1194.31, Functional Performance Criteria, which requires overall usability by people with disabilities. Essentially, the six Functional Performance Criteria require that the EIT must be usable (“at least one mode of operation and information retrieval”) by people with functional limitations in vision, mobility, hearing, and speech.

Compliance with the law requires that EIT meet both the applicable technical standards and the functional performance criteria.

<http://www.section508.gov/index.cfm?FuseAction=Content&ID=12#Functional>

4-2.2 Build and Buy

Section 508 states that: “When *developing, procuring, maintaining, or using* electronic and information technology, each agency shall ensure that the products comply with the applicable provisions...” Therefore, accessibility is a requirement of both purchased information technology and technology developed to meet a unique Postal Service requirement.

4-2.3 When Procuring an EIT Solution

Starting with the market research phase of product selection, and moving through contract award and delivery/implementation, the Postal Service procures the most compliant product that meets business requirements. The Voluntary Product Accessibility Template (VPAT) (*<http://www.itic.org/policy/vpat.html>*) is a standardized template used by agencies and suppliers of information technology to define compliance with Section 508 standards.

To achieve Section 508 compliance on an ongoing basis, the Postal Service must do the following:

- a. Include Section 508 compliance language in all procurement documents.
- b. Require vendors to provide information on how their solution addresses the applicable standards. When available, the Postal Service must request that the vendor provide the Voluntary Product Accessibility Template (VPAT) of all potential products. VPAT is one method that

suppliers use to document how their products are Section 508 compliant. If no VPAT is available, other documentation identifying how the vendor complies with the standards is required.

- c. Verify product compliance with the relevant standards. Testing for accessibility with appropriate methodologies (including using assistive technology) should be done when necessary — during pre-award evaluations and during acceptance testing after delivery,

The above applies to both commercial, off-the-shelf (COTS) products, and purchased customized solutions.

4-2.4 **When Developing or Maintaining an EIT Solution**

When the Postal Service develops a new system, the design must include Section 508 accessibility as an explicit requirement. For maintenance to existing systems, the enhancement and modification requirements must also include improvement in access for people with disabilities. To achieve these goals, the Postal Service does the following:

- a. Assesses the requirements to identify the applicable Section 508 standards.
- b. Includes Section 508 requirements for the people who are involved in the design process to insure the inclusion of these requirements in the relevant ISM steps (exhibit 4-5.2).
- c. Verifies solution accessibility with appropriate methodologies (including using assistive technology) during the development and acceptance testing phases.

4-2.5 **Complex Systems**

Many business solutions are complex and often combine commercial off-the-shelf (COTS) products, custom code by a supplier, custom code by Postal Service developers, and content from various sources.

In comprehensive technology solutions, more than one technical standard may apply. An obvious example is e-learning. The table below shows the diverse functions enabled by various technology mechanisms for the creation of instructional material and access to education services.

Exhibit 4-2.5

Example of Complex Business Solution Involving Various Section 508 Standards

| | Software and Operating Systems | Web | Video and Multimedia |
|--------------------------------------|--|--|--|
| e-Learning training functions | Desktop Computer-Based Training. <ul style="list-style-type: none"> ▪ Complex interaction with user. ▪ May include embedded multimedia/video material. | Learning Management Systems. <ul style="list-style-type: none"> ▪ Registration, browsing, selecting, viewing individual courses. ▪ May include embedded multimedia or video. ▪ May include downloads that launch software or video/media player. ▪ Administrative setup and reporting. | Audiovisual material. May be presented in classroom environment, on the Web, or as an application running on a desktop computer. |
| e-Learning creation functions | Construction of content for desktop application, Web pages, or video presentations. | Construction of Web pages for student and administration functions. | Creation of multimedia (video and audio) content. |

In this example, provisions from three standards (1194.21, Software applications and operating systems; 1194.22, Web-based intranet and internet information and applications; 1194.24, Video and multimedia products) apply. All relevant provisions must be met. A full evaluation requires not only adherence to these specific provisions but an evaluation of the functional performance criteria of the entire system.

4-3 Policy

The Postal Service complies with the legal requirements of Section 508 for all of its purchases of EIT on and after June 21, 2001. The Postal Service is committed to purchasing compliant EIT. There are exceptions, however, as described in this chapter, to the requirement to purchase compliant EIT (see section 4-6).

4-4 Guiding Steps for the Purchase of an EIT Business Solution

While it may seem that Section 508 compliance is daunting because of the range of activities it covers, a simplified look at the pieces reveals how to fit it into a Postal Service business solution.

Step 1. Learn About 508.

To learn about Section 508 requirements, see the following sources:

- HBK AS-508, *Section 508 Handbook*.
<http://www.usps.com/cpim/ftp/hand/as508/welcome.htm>
- Postal Service Intranet or Internet search on Section 508.
- *Purchasing Manual*, <http://blue.usps.gov/cpim/manuals.htm>.

- EIT Accessibility Standards (includes a definition of EIT):
 - <http://www.section508.gov>
 - <http://www.access-board.gov/508.htm>

The Goal — Make text and data as accessible to people with disabilities as it is to people without them.

Step 2. Determine whether EIT is part of the business solution.

- If EIT is *not* part of the business solution, *Section 508 does not apply*. Skip the remaining steps and continue with the normal purchasing process.
- If EIT is part of the solution, determine whether a general exception applies. If a general exception is justified, document the exception and include it in the contract file.

Step 3. Identify the applicable EIT standards and then conduct market research to determine if there are EIT solutions that meet business needs and address the standards.

- Section 508 defines six technical standards, which include many provisions. Keep the following in mind:
 - Some functions are defined by a single standard.
 - Some functions may be covered by multiple standards.
- Research products and services that meet business needs and learn about their Section 508 compliance.
 - Look for the product's Voluntary Product Accessibility Template (VPAT). Many suppliers are using this form to provide information on how they conform to the Section 508 standards. If no VPAT is available, ask the supplier to produce a VPAT or provide comparable documentation.
 - Use research organizations.
 - Search the Internet and supplier Web sites.
 - Contact other government agencies that are already using the product or service.
- Determine if an exception applies (e.g., no product exists that complies with the applicable standards and meets the business requirements). If an exception exists, document it appropriately.

Step 4. Include "Section 508" clauses in the Statement of Work (SOW)

Once market research is complete, work with Supply Management to do the following:

- Develop a solicitation that correctly states Section 508 requirements.
- Determine in the evaluation process if there should be any special instructions to suppliers.
- Include "Section 508" concepts in the internal design or implementation documents.

Step 5. Evaluate and test products based on “Section 508” standards

Evaluation and selection activities are key components in positioning the Postal Service to meet its Section 508 compliance commitments. In evaluating and testing products, follow these guidelines:

- Compare supplier responses that meet Section 508 requirements.
- Determine how to evaluate and test suppliers’ proposed solutions for compliance. This varies, depending on the complexity of the solution. There are different ways in which proposed solutions can meet the requirements. For information on exceptions and undue burdens, see sections 4-3 and 4-6 of this handbook.
- For products that do not fully conform, a specific exception may be needed (see section 4-3).
- Conduct testing and evaluation, which may include the following:
 - Demonstrations by the supplier.
 - Testing by the Postal Service or third-party suppliers.
 - Literature evaluation.

Proof of Compliance — If your product provides at least one mode of operation and retrieval that does not need user vision, hearing, or fine motor skill or provides support using assistive technology, it is compliant.

Step 6. Plan Delivery

Before delivery of a solution, an acceptance test is a standard procedure to verify that the supplier has met its contractual obligations. The Postal Service can conduct and may require the contractor to perform Section 508 testing with multiple techniques. See the resources in the technical reference guidelines for recommended approaches. Before accepting a purchase, do the following:

- Test compliance with the stated accessibility standards.
- Work with the vendor to address issues where the vendor does not meet standards.
- Work with Supply Management to address the issue, if the deliverable does not meet standards.

The Measure of Success — Success is measured by compliance at the text or data “interface,” (i.e., where the person with a disability can access information).

4-5 Integrated Systems Methodology (ISM) Overview

This section shows how Section 508 integrates into the systems development life cycle. The ISM unifies Postal Service development life-cycle methodologies used by contractors and Postal Service project managers. The ISM defines a life-cycle framework that provides a roadmap for conceiving, planning, developing, implementing, and maintaining business solutions. It contains the key minimum, mandatory deliverables that are required to deliver a business solution successfully to the customer.

The goals of the ISM are to do the following:

- Reduce solution development and deployment costs.
- Speed the time to deployment of technology solutions.
- Provide a single point of access to all the current policies, procedures, instructions, and templates.

Exhibit 4-5.1 addresses elements of the Section 508 process for both the Purchase or Lease of IT and for the Build or Customization of IT.

Exhibit 4-5.1

Purchase or Lease of IT: Section 508 Considerations in the EIT Life Cycle

This chart clarifies key Section 508 considerations that must be factored into mandatory EIT life cycle tasks by the various people and functional organizations responsible described in Chapter 2, Roles and Responsibilities. This information is aligned with the Information Technology Division’s Integrated Systems Methodology (ISM), but can be used in other current or future EIT governance processes. Boldface text indicates formal work products for which Section 508 considerations must be documented.

| Phase | Tasks & Work | 508 Considerations | People or Organizations Responsible |
|--|--|--|---|
| <p>Concept Define business need and solution concept.</p> | <p>Develop Business Needs Statement and Initial Solution Concept.</p> | <p>Determine whether EIT is part of solution. If it is, do the following:</p> <ul style="list-style-type: none"> ▪ Identify applicable EIT standards based on access considerations for candidate stakeholder interactions / interfaces. ▪ Ascertain possible “general exception.” | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ IT Portfolio Manager (support) |
| <p>Planning Develop business case and program plan, obtain funding.</p> | <p>Produce program, project, and procurement schedules and plans.</p> | <ul style="list-style-type: none"> ▪ Ensure that applicable Section 508 technical requirements are included in Procurement Plans. ▪ Include estimates for resources required to support compliance with Section 508 requirements. | <ul style="list-style-type: none"> ▪ IT Portfolio Manager (own) ▪ Project Managers (support) ▪ Contracting Officers (support) |
| | <p>Develop business case analysis and ensure alignment with Enterprise Architecture.</p> | <p>Position possible EIT solution scenarios (e.g., lease or buy vs. build, internal vs. outsource).</p> <ul style="list-style-type: none"> ▪ Include Section 508 business value, affects, and risks related to the EIT solution. ▪ Conduct a product and solution type market research (potential vendors’ Section 508 compliance qualifications or VPATs, cross-solution research via trusted research sources such as Gartner, Giga, etc.). | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ Executive Sponsor (own) ▪ IT Portfolio Manager (support) ▪ Enterprise Architecture Staff (support) ▪ Contracting Officer (support) |
| | <p>Evaluate EIT</p> | <ul style="list-style-type: none"> ▪ Ensure that solution components will be included in the Infrastructure Toolkit (ITK). | <ul style="list-style-type: none"> ▪ IT Portfolio Manager (own) ▪ Enterprise Architecture Staff (support) |

Section 508 — Postal Service Processes to Comply

| Phase | Tasks & Work | 508 Considerations | People or Organizations Responsible |
|---|--|--|--|
| <p>Development Design, build, lease, buy and test the EIT solution.</p> | <p>Perform requirements analysis.</p> | <p>Ensure that applicable Section 508 technical requirements are addressed in relevant areas of Requirements Document: Functional, Technical, Data, Interfaces, Security, and Implementation.</p> | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ IT Portfolio Managers (support) ▪ Business Solution Services (IBSSCs) (support) ▪ Development Teams and Vendors (support) |
| | <p>Solicit bids, award contract, and test the solution:</p> <ul style="list-style-type: none"> ▪ Write solicitations (RFPs) and statements of work. ▪ Evaluate supplier responses. ▪ Plan and conduct solution tests. | <ul style="list-style-type: none"> ▪ Ensure that applicable Section 508 technical requirements are included in solicitations (RFPs) and statements of work. ▪ Assist in evaluation of vendor responses, including development of evaluation criteria and assessment of vendor Voluntary Product Accessibility Templates (VPATs). ▪ Ensure that Section 508 testing methods are included in Customer Acceptance Tests. ▪ Plan, conduct, and review solution and customer acceptance tests, using applicable Section 508 testing methods. | <ul style="list-style-type: none"> ▪ Contracting Officer (own) ▪ IT Portfolio Manager (support) ▪ Vendors (support) ▪ System Documentation Caretaker (support) |
| <p>Implementation Certify, accept, and deploy EIT solution.</p> | <p>Certify and document Section 508 compliance in certification and system documentation.</p> | <ul style="list-style-type: none"> ▪ Certify and document level of Section 508 compliance in a Postal Service operational environment. ▪ Create Section 508 exception documents, where necessary, before deployment (see appendix 4-A). | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ Contracting Officer (own) ▪ IT Portfolio Manager (own) ▪ Development Teams and Vendors (support) ▪ System Documentation Caretaker (support) |
| <p>Operations Management Maintain and enhance solution, close out project.</p> | <ul style="list-style-type: none"> ▪ Obtain user feedback and evaluate EIT solution for ongoing Section 508 compliance. ▪ Create change requests to resolve Section 508 compliance issues and improve solution performance. | <ul style="list-style-type: none"> ▪ Update certification and system documentation. ▪ Update appropriate databases: ITK for leased/bought solutions. ▪ Evaluate and update Section 508 exception documents when solutions are modified (see appendix 4-A). | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ IT Portfolio Manager (own) ▪ System Documentation Caretaker (support) |

Exhibit 4-5.2

Development or Customization of IT: Section 508 Considerations in the EIT Life Cycle

This chart clarifies key Section 508 considerations that must be factored into mandatory EIT life cycle tasks by the various roles described in Chapter 2, Roles and Responsibilities. This information is aligned with the Information Technology Division’s Integrated Systems Methodology (ISM), but can be used in other current or future EIT governance processes. Boldface text indicates formal work products for which Section 508 considerations must be documented.

| Phase | Tasks & Work | 508 Considerations | People or Organizations Responsible |
|--|--|---|--|
| <p>Concept Define business need and solution concept.</p> | <p>Develop Business Needs Statement and Initial Solution Concept.</p> | <p>Determine whether EIT is part of solution. If it is, do the following:</p> <ul style="list-style-type: none"> ▪ Include persons with disabilities in stakeholder profiles. ▪ Identify applicable EIT standards based on access considerations for candidate stakeholder interactions or interfaces. ▪ Ascertain possible “general exception.” | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ IT Portfolio Manager (support) |
| <p>Planning Develop business case and program plan, obtain funding.</p> | <p>Produce program, project, and procurement schedules and plans.</p> | <ul style="list-style-type: none"> ▪ Ensure that applicable Section 508 technical requirements are included in procurement plans. ▪ Include estimates for resources required to support compliance with Section 508 requirements. | <ul style="list-style-type: none"> ▪ IT Portfolio Manager (own) ▪ Project Managers (support) ▪ Contracting Officers (support) |
| | <p>Develop business case analysis and ensure alignment with Enterprise Architecture.</p> | <p>Position possible EIT solution scenarios (e.g., lease or buy vs. build, internal vs. outsource).</p> <ul style="list-style-type: none"> ▪ Include Section 508 business value, affects, and risks related to the EIT solution. ▪ Conduct a product-and-solution type market research (potential vendors’ Section 508 compliance qualifications or VPATs, cross-solution research via trusted research sources such as Gartner, Giga, etc.). ▪ Ensure alignment with enterprise architecture. | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ Executive Sponsor (own) ▪ IT Portfolio Manager (support) ▪ Enterprise Architecture Staff (support) ▪ Contracting Officers (support) |
| | <p>Register EIT.</p> | <ul style="list-style-type: none"> ▪ Register the solution in the Enterprise Information Repository (EIR). | <ul style="list-style-type: none"> ▪ IT Portfolio Manager (own) ▪ Enterprise Architecture Staff (support) |

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| Phase | Tasks & Work | 508 Considerations | People or Organizations Responsible |
|---|---|--|--|
| <p>Development Design, build, lease, buy and test the EIT solution.</p> | <p>Perform requirements analysis.</p> | <p>Ensure that applicable Section 508 technical requirements are addressed in relevant areas of the Requirements Document: Functional, Technical, Data, Interfaces, Security, and Implementation.</p> | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ IT Portfolio Manager (support) ▪ Business Solution Services (IBSSCs) (support) ▪ Development Teams and Vendors (support) |
| | <p>IF a custom solution is to be constructed by a supplier, perform procurement processes (send RFP, evaluate vendor responses).</p> | <p>Ensure that Section 508 considerations are enforced in <i>all procurement processes</i>:</p> <ul style="list-style-type: none"> ▪ Develop solicitations (RFPs) and statements of work. ▪ Assist in evaluation of supplier responses, including development of evaluation criteria. | <ul style="list-style-type: none"> ▪ Contracting Officers (own) ▪ Functional Organization Client (support) ▪ IT Portfolio Manager (support) ▪ Project Managers (support) |
| | <p>Design, build, and test the solution:</p> <ul style="list-style-type: none"> ▪ Develop design documents. ▪ Produce development code and materials. ▪ Plan and conduct solution tests. | <ul style="list-style-type: none"> ▪ Ensure that applicable Section 508 technical requirements are included in design specifications. ▪ Design and create Section 508 compliant development code and materials. ▪ Plan and conduct solution and customer acceptance tests, using applicable Section 508 testing methods (see <i>Chapters 5–11</i>). | <ul style="list-style-type: none"> ▪ IT Portfolio Manager (own) ▪ Functional Organization Client (support) ▪ Business Solution Services (IBSSCs) (support) ▪ Development Teams and Vendors (support) |
| <p>Implementation Certify, accept, and deploy EIT solution.</p> | <p>Certify and document Section 508 compliance in certification and system documentation.</p> | <ul style="list-style-type: none"> ▪ Ensure that Section 508 testing methods are included in customer acceptance tests. ▪ Certify and document level of Section 508 compliance after customer acceptance test in a Postal Service standard operational environment. ▪ Create Section 508 Exception Documents where necessary prior to deployment (see appendix 4-A). | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ Contracting Officer (own) ▪ IT Portfolio Manager (own) ▪ Development Teams & Vendors (support) ▪ System Documentation Caretaker (support) |
| <p>Operations Management Maintain and enhance solution, close out project.</p> | <ul style="list-style-type: none"> ▪ Obtain user feedback and evaluate EIT solution for ongoing Section 508 compliance ▪ Create change requests to resolve Section 508 compliance issues and improve solution performance. | <ul style="list-style-type: none"> ▪ Update certification and system documentation. ▪ Update appropriate databases: EIR for Postal Service-built solutions. ▪ Evaluate and update Section 508 exception documents when solutions are modified (see appendix 4-A). | <ul style="list-style-type: none"> ▪ Functional Organization Client (own) ▪ IT Portfolio Manager (own) ▪ System Documentation Caretaker (support) |

4-6 About Exceptions and Undue Burden

There are three types of exceptions that can be invoked and still achieve Section 508 compliance. The three types — general exceptions, specific exceptions, and undue burdens — are described below. These exemptions exist for different reasons and may be invoked at different stages of the procurement or development cycle (see exhibits 4-5.1 and 4-5.2). Some technology solutions are inherently exempt by nature of the technology use. These are **general exceptions** and involve such fields as military security or other areas of national defense.

4-6.1 General Exceptions

The determination of a general exception is based on how the EIT is to be used. General exceptions are typically identified very early in the process. General exceptions include:

- a. Purchases of EIT required for national security, as described in the Electronic and Information Technology Accessibility Standards, 36 CFR Section 1194, Subpart 1194.3(a).
- b. Purchases of EIT acquired by a supplier incidental to a contract.
- c. Purchases of EIT to be located in spaces frequented only by service personnel for maintenance, repairs, or occasional monitoring of equipment.

4-6.2 Specific Exceptions

These exceptions typically occur when no existing product that best meets the business requirements of the Postal Service is fully compliant. In these cases, the market research documents that show no fully compliant technology solution is available will provide an explanation for the purchase of a noncompliant solution.

Reasons for a specific exception include the following:

- a. Purchases of EIT that are less compliant than other EIT available in the commercial marketplace, but that meet all the accessibility standards that can be met within the deadline required by the Postal Service.
- b. Orders of noncompliant EIT against indefinite delivery contracts or ordering agreements that already have appropriate exception documentation in the contract file.
- c. Purchases of noncompliant EIT when no compliant EIT is available in the commercial marketplace.

Since the goal of Section 508 is to produce an environment in which data and information are available to disabled citizens and government employees, the Postal Service views specific exceptions as temporary. The long-term goal is continual improvement to achieve full compliance.

4-6.3 **Undue Burden Exception**

Undue burden “means significant difficulty or expense.” “In determining whether an action would result in an undue burden, an agency shall consider all agency resources available to the program or component for which the product is being developed, procured, maintained, or used” (65 *Federal Register* 80502). These rare exemptions require the signature of a Postal Service vice president on behalf of the requesting functional organization.

From the procurement perspective, Section 508 standards do not require the purchase of EIT that would require a *fundamental alteration* in the nature of a product or its components. From the development perspective, technology designed and built specifically for the Postal Service must be fully compliant.

4-7 **Documentation of Exceptions**

When the purchase of an EIT solution falls within even one of the three exception areas, the Postal Service requires the functional organization to document the rationale for the exception. Supply Management, with the functional organization, must include the relevant market research documentation in the contract file. For general and specific exceptions, the documentation is relatively easy to prepare. When the purchase of an EIT solution would result in an undue burden to the Postal Service, the requiring organization must prepare an undue burden justification, signed by the vice president of the requiring organization. The template for documenting undue burden is found in appendix 4-A.

4-8 **Roles and Responsibilities**

Chapter 2 of this handbook describes roles and responsibilities. The officials named in Chapter 2 define what compliance means and evaluate compliance efforts in their respective areas of responsibility for the Postal Service. The purchase, development, or maintenance of EIT occurs at the level of a specific functional organization. At the functional level, complex business needs often require multifaceted systems which span the technical areas of the law (see section 4-2.4 above). Consequently, responsibility for evaluation of compliance for a complex solution may involve Postal Service personnel from the requiring organization (business analysts, portfolio managers, etc.), Supply Management (contracting officers), the General Counsel's office, and the Section 508 Program.

4-9 Exception Documentation

The purpose of exception documentation is to explain the business needs and to account for compliance of available solutions. For General Exceptions (a rare Postal Service need), documentation will address one of the three valid reasons for such an exception.

For Undue Burden, the exception report will require extensive documentation and will attract the attention of the Department of Justice (see appendix 4-A).

For Specific Exceptions, the reasons for the exception (see section 4-6.2) must be defined fully.

Three other actions must occur:

- a. The documentation must be summarized in the database(s) that track Postal Service compliance (e.g., EIR, ITK, ADEPT, etc.) to facilitate accurate reporting to the Department of Justice on a periodic basis.
- b. An alternate means must be provided to allow people with disabilities to access the functions or information.
- c. A plan must be defined for future reevaluation and eventual full compliance (e.g., newer releases of the software or selection of a more compliant product that provides the same business solution). The plan should specify reevaluation dates.

4-10 Preparing Undue Burden Justification

Undue burden justification is required when the EIT purchase meets the conditions stated in section 4-6.3. The rationale for such a determination must be based on the fact that purchase of the most compliant EIT would constitute an undue burden to the Postal Service. The undue burden justification documentation addresses why, and to what extent, compliance with each applicable provision of Section 508 creates an undue burden.

An undue burden justification template is provided in appendix 4-A of this chapter. The requiring organization must complete the template and include sufficient detail to establish that an undue burden exists. The contracting office must retain a copy of the documentation with the necessary approvals in the contract file.

Template for Undue Burden Justification Documentation

This template provides guidance for preparing an undue burden justification document. The requiring organization must use this template when either of the following is true:

- A decision is made to purchase electronic and information technology (EIT) that is less compliant with Section 508 than what is available in the commercial marketplace.
- The purchase of the more compliant EIT would impose a significant difficulty or expense to the entire program or component for which the product is being purchased.

Instructions:

- Prepare written documentation addressing the applicable sections below. The depth of detail provided will vary, depending on the dollar value of the purchase, importance to the agency, number of potential users, business or operational affect, and other issues.
- Obtain purchasing and legal advice, as needed, throughout the process.
- Obtain necessary approvals and signatures.
- Provide completed justification documentation to the contracting officer.
- Update the Enterprise Information Repository (EIR) system, where appropriate.

Section I. General

- a. Program Name.
- b. Preparer's Name.
- c. General description of the program.

Section II. Basis for Justifying the Undue Burden Exception

An undue burden is defined as "a significant difficulty or expense." When making an undue burden determination, the requiring organization must consider the entire resources available to the program or component for which the product is being purchased. Attempt to include all known facts and situations that influence the justification of significant difficulty or expense.

- a. Identify the specific applicable portions of the Section 508 standards for which a decision has been made to purchase something that is less compliant than what is available in the commercial marketplace. Include a description of the market research performed.
- b. For each element, describe the significant difficulty or expense. Below are some examples of considerations that may constitute either a significant difficulty or expense.

| Considerations | Example |
|--|---|
| <p>Incompatibility Consider the Postal Service’s IT infrastructure, including security, and the difficulty of integrating the EIT product into that infrastructure.</p> | <p><i>An agency wants to contract with a digital cellular provider for cellular phone service. The agency learns that TTY signal protocols are required, and the agency digital cellular network cannot accommodate them, because the digital cellular network and TTY protocols are not compatible. In order to provide accessible digital cellular phone service, the agency would have to replace its digital cellular network. An evaluation is done, and it is determined that this represents an enormous expense and difficulty.</i></p> |
| <p>Nature and cost of compliance Consider and address these elements in formulating the required cost-benefit analysis as appropriate:</p> <ul style="list-style-type: none"> ▪ Overall financial resources available to the program of the requiring or ordering activity funding the purchase. ▪ The number of persons (members of the public and/or Postal Service employees) affected by noncompliance. | <p><i>An agency is going to procure five kiosks for a proof-of-concept on a new way of providing agency information and conducting transactions with its customers. The cost to make the experimental kiosks compliant is more than the cost of the trial itself. However, if the proof of concept is successful, the final implementation would be built to comply with Section 508. In this case, an undue burden could be determined for the proof-of-concept phase of the program.</i></p> |

Section III. Alternate Means or Format of Access

Describe the alternate access method or format being provided that allows the disabled individual to have access to and use of the information and data comparable to that provided by the less than compliant EIT.

Section IV. Future Purchases

If applicable, describe the plans to obtain compliant EIT in future purchases.

Section V. Comparison of Cost

If applicable, provide a summary of the cost analysis justifying acquisition of the less compliant EIT.

Section VI. Approval

The vice president or person in a higher level of the requiring organization must approve this justification.

| | | |
|------------------------------|----------------|------|
| Preparer | Name and title | Date |
| Program Manager | Name and title | Date |
| Vice President (Required) | Name and title | Date |

5 Software Applications and Operating Systems

5-1 Overview

5-1.1 Contents

This chapter contains the specific electronic and information technology (EIT) performance requirements related to the following subpart of Section 508:

EIT Technical Standard 1194.21, Software Applications and Operating Systems, Provisions (a) thru (l).

5-1.2 Summary

5-1.2.1 Technology

The requirements in this chapter cover the following:

- All software applications and operating systems used by the Postal Service (as defined by the Access Board), regardless of size or whether purchased or developed internally. “Software applications” refers to client-server and locally installed software applications that do not use a Web-based interface. Web-based information and applications are covered in Chapter 6, Web-based Information and Applications.
- All associated data, information, training material, and documents related to those software applications and operating systems.

Note: For applications that span more than one technical standard, you may need to synchronize general and specific requirements in this chapter with requirements given in other chapters in this handbook. For example, client-server application or application sub-system functionality usually must also comply with the requirements stated in Chapter 6, Web-Based Information and Applications. Software applications that include calls to video or multimedia or that are supersets of software that run on self-contained platforms or in kiosks may require synchronization with other chapters. When software applications are used to create informational output beyond direct interaction with the application itself, (e.g., reports, data files, dynamic forms, or media objects), this output must also be accessible to assistive technology users.

5-1.2.2 Audience

This chapter applies to anyone who buys or develops software applications and operating systems for the Postal Service (i.e., Postal Service employees, suppliers, contractors, and business partners). Software applications and operating systems include information technology solutions of all sorts, consisting of simple or complex purchases or development of software applications, operating systems, and all associated data, information, training material, and documents.

5-1.3 Structure and Use

Each part of this chapter describes the specific requirements that support one or more provisions in the technical standards of software applications and operating systems. The technical standards of Section 508 were written primarily from a technology perspective. However, the Postal Service has consolidated some provisions to help Postal Service employees and business partners understand Postal Service compliance requirements from the perspective of designing for accessibility. Each specific requirement includes a rationale, techniques, testing methods, and references as shown below in section 5-2.

5-1, Overview

5-2, Keyboard Access (Provision §1194.21a)

- Rationale
- Techniques (and Exhibits)
- Testing
- References

5-3, Activated Accessibility Features (Provision §1194.21b)

5-4, On-Screen Focus (Provision §1194.21c)

5-5, User Interface and Programmatic Elements (Provision §1194.21d)

5-6, Consistent Use of Images (Provision §1194.21e)

5-7, Textual Information (Provision §1194.21f)

5-8, User-Selected Display Attributes, Color, and Contrast
(Provisions §1194.21g and §1194.21j)

5-9, Animation (Provision §1194.21h)

5-10, Color Coding (Provision §1194.21i)

5-11, Video Frequency (Provision §1194.21k)

5-12, Forms (Provision §1194.21l)

Appendix 5-A, Checklist

Appendix 5-B, Testing Methods

Note: The exhibits used to illustrate various techniques that satisfy specific requirements often refer to the Microsoft Windows® operating

system and its compatible applications. This is because the Microsoft Windows platform represents the largest base of installed systems within the Postal Service.

5-1.4 Introduction to Software Accessibility

Software is the program that runs on electronic equipment. The general concept of software accessibility is that the assistive technology should work with the program to allow its features and functions to be understood.

Software developers are responsible for helping the screen reader understand the screen. For instance, a mouse can be used with a piece of software, but blind users do not use mice. They need another method to understand the functions of a toolbar, radio buttons, push buttons, drop-down menus, or pop-up messages explaining the function of an icon.

Since several different programming languages are used in software and operating system coding, specific code examples and techniques cannot be provided. The main goal of this chapter is to help developers create software applications that recognize and maximize the capabilities of the accessibility features installed and activated by a user (e.g., native hardware and operating system features or installed assistive technologies aids). Developers are required to make specific applications compliant with Section 508 by developing their own methods and approaches that result in compliant software. There are two main ways to do this. First, the developer can make the software application accessible using the native operating system accessibility features or, second, the developer can make the application compatible with assistive technologies. Section 3-3, Assistive Technologies, lists the assistive technologies with which software applications must be tested with in the postal computing environment.

5-1.5 General Requirements

Accessibility is accomplished by designing software that accommodates the widest range of users, including those with disabilities. Listed below are some general requirements that will help the Postal Service ensure continued accessibility of software applications and operating systems:

- The Postal Service should develop and procure software applications that take advantage of **hardware and operating system built-in accessibility features** when those features are available to both end users and software developers.
- The Postal Service will maintain standards for the following categories of **assistive technologies** that people with disabilities use to access software applications and operating systems:
 - *Screen magnifiers*: Help visually impaired people by allowing them to enlarge any part of the screen (i.e., as with a magnifying glass).
 - *Screen readers*: Help people who are blind by making on-screen information available as synthesized speech or for display as refreshable Braille.

- *Voice input aids:* Help mobility- or dexterity-impaired people by allowing them to control the computer with their voice instead of with a mouse or keyboard.
- *On-screen keyboards:* Help people who are unable to use a standard keyboard by providing an on-screen keyboard that can be used with a pointing device.
- *Keyboard filters:* Help people who have trouble typing by compensating for erratic motion, tremors, or slow response time.
- *Alternative input devices:* Help people who would prefer to control their computer with a device other than a keyboard or mouse.
- The Postal Service will develop **software applications** that recognize and maximize the capabilities of the accessibility features installed and activated by a user (e.g., native hardware and operating system features as well as installed accessibility aids). Software developers should do the following:
 - *Support native operating system and activated accessibility features* for major operating systems that are integrated with input and output devices (e.g., keyboard, sound, display, or mouse). Standards for each operating system related to each specific requirement are shown in the “References” area under each specific requirement.
 - *Use standard controls* for particular operating systems where possible (e.g., menus, buttons, lists, or windows). These standard controls often already support native operating system accessibility features. Using them will often eliminate the need for software to provide explicit accessibility support, unless the behavior of the standard controls has been enhanced.
 - *Be careful when using custom controls or enhancing standard controls*, because accessibility aids may have difficulty identifying them (i.e., accessibility aids require specific information to work successfully with screen elements). When custom or enhanced standard controls are used, developers must use appropriate accessibility interfaces or application programming interfaces (APIs) (e.g., Sun’s Java Access Bridge, Microsoft Active Accessibility, window messaging, off-screen model, etc.) to provide object information to accessibility aids. The information that must be provided by objects includes name, location, type, associated values, parent control, logical order for navigation, and event notifications, such as focus gain or loss.
 - *Provide flexibility in using a variety of input methods* (e.g., keyboard or mouse) and output methods (e.g., color, sound, images, or text).
 - *Query accessibility aids in use by the operating system and configure the software applications automatically.* For example, a Microsoft Windows application can check Windows system information (i.e., SystemParameterInfo) to determine when a

screen reader is in use (i.e., SPI_GETSCREENREADER). Windows will also invoke a message when system information is changed so that the software can be reconfigured.

Finally, Postal Service employees are required to register all software applications and operating systems in the Enterprise Information Repository (EIR) at <http://eir>. This information will be used to report compliance and includes any related Section 508 noncompliance issues.

5-1.6 Testing for Compliance

When testing software applications for compliance, it is important to be aware that a software application can include only functionality that is supported by the operating system on which it executes. For example, an application running on Microsoft Windows can provide all the graphical functionality that users have come to expect from the current generation of personal computers. However, if those same users operate their computers in MS-DOS operating system mode, they are restricted to a primarily character-based environment with little graphical capabilities. It is crucial to be aware of the software environment the user is accessing when considering review and accessibility compliance with Section 508. In addition, it is important to be cognizant of the functionality available to users with disabilities via the accessibility aids available on the operating system in use.

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools or integrated development environment (IDE) features can help automate these methods, but automated testing must be accompanied by manual testing. For example, a developer can use IDE tools to test for valid *syntax* (e.g., titling of all windows, naming of all objects, inclusion of alternative text, or closing of tags), but a manual inspection must still be done to validate *semantics* and proper *rendering*. In other words, the *meaningfulness* of the window titles or alternative text must also be considered for the end user who uses assistive technology.

5-2 Keyboard Access

When software applications are designed to run on a system that has a keyboard, software application functions must be executable from a keyboard, if the function itself or the result of performing the function can be identified or labeled with text (Section 508, Provision §1194.21a).

5-2.1 Rationale

Keyboard access is essential for those who cannot use a mouse or another method to interact with a computer. People who are unable to see the screen or accurately control and use a mouse must be able to use the keyboard to access menus, toolbars, windows and dialogs, controls, and other software application and operating system user interface elements.

Operating system platforms use standard keyboard access keys and key combinations — called keyboard equivalents — which must be provided for in software applications. Keyboard access to controls must be provided in a logical order that makes sense to people who are visually impaired. Visually impaired users often explore window controls sequentially instead of scanning an entire window as sighted users would. Therefore, the contents of all application windows and dialogs must also be understandable by people who are visually impaired.

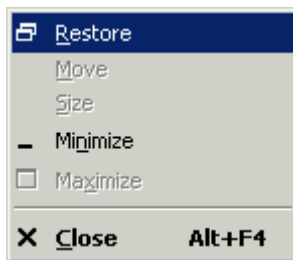
5-2.2 Techniques

5-2.2.1 Provide Keyboard Access to Menus

Provide the ability to navigate to and select each menu and menu item with standard *access keys*. This includes the menu bar, system menu, and context-sensitive menus.

Exhibit 5-2.2.1

Example of Keyboard Access to a Menu



An example of keyboard access to a global window menu that contains commands for manipulating windows. The figure shows a global window menu that is a standard control in the Microsoft Windows operating system. The menu can be accessed from any active window by pressing ALT and SPACEBAR at the same time.

In the figure shown here, the software provides three ways to interact with the menu. First, the user can manipulate the active window from this menu by using the ARROW keys to navigate the menu items, then pressing the ENTER key.

Second, the user can access the menu items by pressing various keyboard equivalents (i.e., “shortcut keys” in the Windows Operating System) that are indicated in underlined characters (e.g., “R” key to restore the window size, “N” key to minimize the window, and “C” key to close the window). Screen readers will read aloud the menu item followed by the keyboard equivalent (e.g., “Restore,” “R”).

Third, the user can access these menu commands directly by typing the keyboard equivalent and not even invoking the menu. For example, the active window could be closed by typing the defined keyboard equivalent (ALT+ F4).

5-2.2.2 Provide Keyboard Access to Toolbars

Provide redundant menu items that allow users to access all toolbar actions or provide keyboard access to toolbars. Toolbar commands provide convenient access to frequently used functionality (i.e., saving or printing a file). However, toolbar objects are sometimes not available from the keyboard (i.e., they are not within the tab order of the window). Therefore, all toolbar *functionality* should be available through the menu items or documented access keys and key combinations.

Exhibit 5-2.2.2

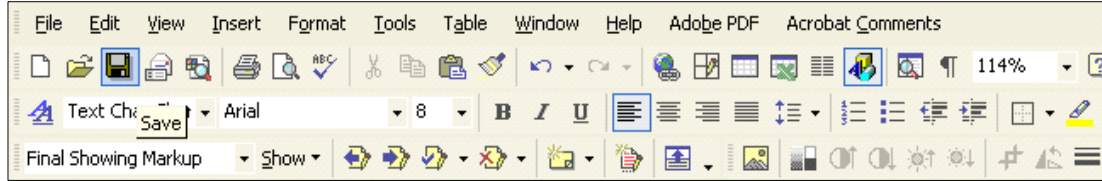
Example of Keyboard Access to Toolbars

Figure A. The standard toolbar with the “Save” toolbar item selected and highlighted.

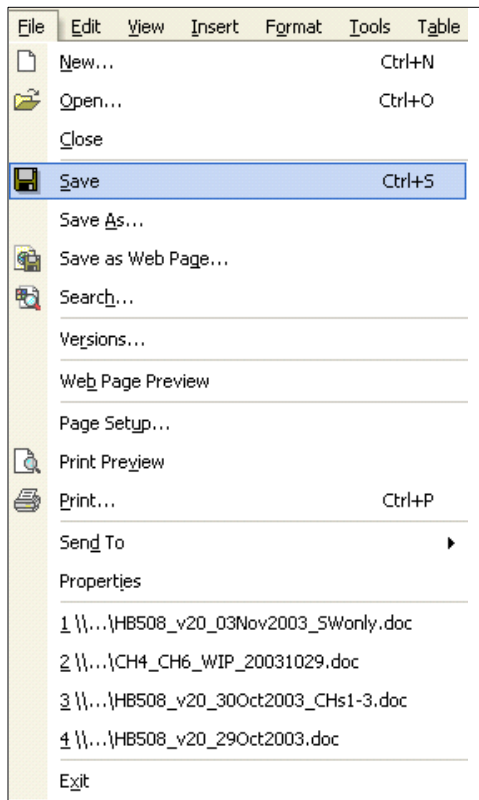


Figure B. The “File” menu expanded to show redundant access to the “Save” function offered in the toolbar.

An example of toolbar accessibility in a word processing software application.

In this software application, all toolbars can be accessed using standard keyboard equivalents by first pressing the ALT key, then using CTRL+TAB to navigate sequentially between all available toolbars (e.g., standard, formatting, etc.) and toolbar items. Once a toolbar has been selected, specific toolbar items can be accessed using the keyboard ARROW keys.

In **Figure A**, a “Save” toolbar item is selected as indicated by the blue highlight or outline surrounding the toolbar item’s icon (i.e., a diskette). Pressing the RETURN key would activate the “Save” function just as if clicked on with a mouse.

In addition, as shown in **Figure B**, this same “Save” function can be accessed via a keyboard accessible “File” menu by using ALT+F then pressing “S” or by CTRL+S.

5-2.2.3 Provide Keyboard Access to Window Elements

Provide the ability to move the focus between application windows, sections or panes of application windows, and dialogs using standard keyboard equivalents. It is common for software to use panes or splitter bars to display more information without requiring additional windows (e.g., Windows Explorer). Use standard keyboard equivalents to allow users to move, resize, minimize, restore, maximize, scroll, and close windows. Applications that employ nonstandard access keys and methods for performing these functions must provide and communicate the alternate keyboard access methods.

Exhibit 5-2.2.3

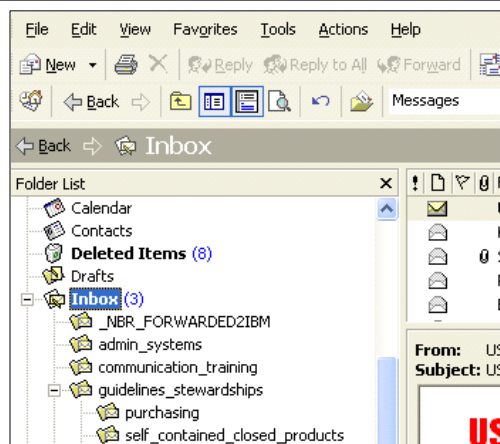
Example of Keyboard Access to Window Elements

Figure A. The “Folder” window display pane with focus highlighted.

An example of keyboard access to three distinct window display areas separated by panes in an e-mail client software application.

In **Figure A**, the focus is currently on the “Inbox” folder in the “Folder List” window pane, as indicated by the blue solid highlight around the word “Inbox.”

This software application allows users to navigate (i.e., move the focus) between the three distinct window areas by pressing a standard keyboard equivalent for the Windows operating system, the F6 key.

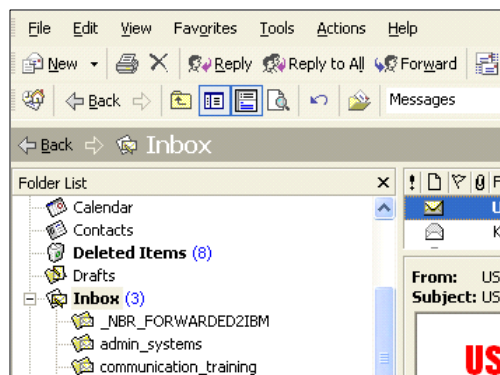


Figure B. The “Message Listing” window display pane with focus highlighted.

In **Figure B**, the focus has been moved to the “Message Listing” window display pane (in the upper-right) by pressing the F6 key. This is indicated by the blue solid highlight around the message from “USPS News Link — Washington.”

Pressing the F6 key again would move the focus to the third pane, the “Message Preview” window display pane, shown in the lower right below the “Message Listing” window display pane. Pressing the F6 key again would move the focus back to the “Folder List” window pane shown in Figure A.

5-2.2.4 Provide Keyboard Access to Controls

Provide the ability to operate every control in application windows and dialogs using the keyboard and to navigate logically between controls. Keyboard equivalents allow people to navigate between groups of controls (such as index tabs) and then select specific objects (i.e., check boxes, drop-down selection, or buttons) by using a combination of ALT, TAB, CTRL+TAB, the F6 key, and the ARROW keys. Pressing ENTER and SPACEBAR are conventions for operating controls.

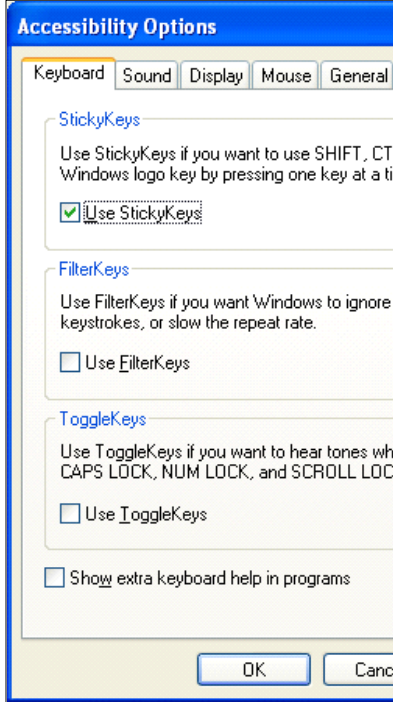
Design navigation between controls using a logical tab order, so that the TAB key moves the keyboard focus from one control or item to the next. Normally, the tab order is from left to right and then top to bottom.

Allow users to scan the contents of application windows and dialogs before providing input by offering screen-level validation instead of control-level validation. When control-level input is required, valid, preselected default values prevent users from scanning through window controls sequentially without providing input. When it is not possible to preselect control-level

input, use screen-level validation (i.e., validate user input when the user attempts to save all changes or submit input within the screen).

Exhibit 5-2.2.4

Example of Keyboard Access to Controls



An example of keyboard access to controls in the Windows XP™ operating system dialog window that allows the user to select “Accessibility Options.”

This figure shows five tabbed groupings of related controls that can be accessed using the keyboard equivalent CTRL+TAB. The “Keyboard” group of controls is selected here.

Within each grouping, the TAB key can be used to navigate logically among various controls such as check boxes and push buttons. The SPACEBAR key can be used to toggle the selection on the control that has focus (e.g., the “Use StickyKeys” checkbox has focus here).

In addition, various dialog-level keyboard equivalents are offered, as each checkbox item and push button contains underlined characters that indicate a keyboard shortcut (e.g., pushing the “S” key will select the “Settings” for “StickyKeys”).

5-2.2.5 Provide Keyboard Access to Commonly Used Functions

Provide standard keyboard access keys or key combinations for functions that are most commonly used and that are normally provided through mouse operations. This includes commonly used commands such as text or object selection, clipboard commands (e.g., cut, copy, and paste), or graphic resizing.

Exhibit 5-2.2.5

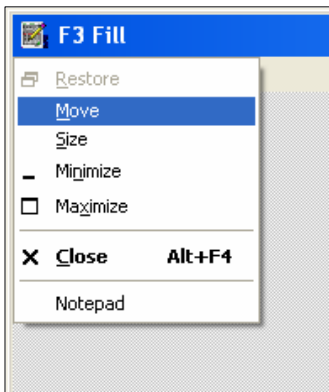
Examples of Keyboard Access to Commonly Used Functions (p.1)

Figure A. Selecting items in an active window's menu using the keyboard.

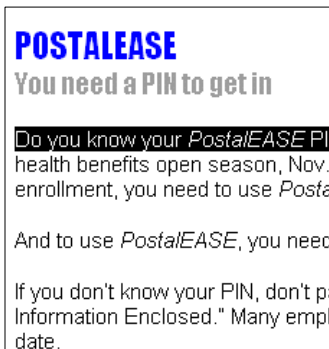


Figure B. Selecting text using the keyboard.

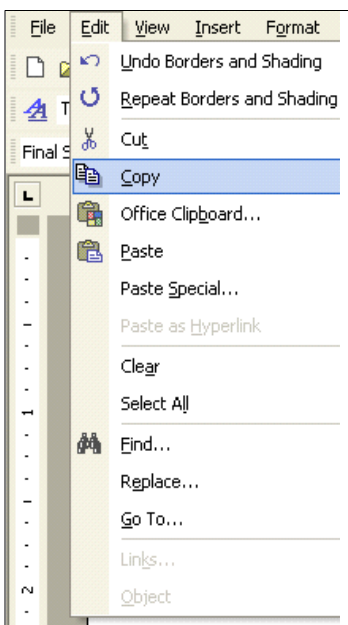


Figure C. Accessing an "Edit: Copy" function from a menu.

Figures A through E show examples of keyboard access to functions that are commonly used and that are normally provided through mouse operations.

Figure A shows a standard Microsoft Windows global window menu that contains commands for manipulating an active window. This menu can be accessed by pressing ALT and SPACEBAR at the same time.

The ARROW keys can be used to move the focus between menu items. Here, the "Move" menu item is selected, as indicated by the blue filled box surrounding it. If the user presses the ENTER key while over this item, they will be able to move the active window using their ARROW keys. The user could also select the "Move" menu item by selecting the "M" key, which is indicated as a keyboard equivalent here.

Figure B shows an example of selecting text using the keyboard in a text editor program. The user can hold the SHIFT key down and press the ARROW keys to select contiguous characters near the text input cursor.

The user can also press CTRL+SHIFT+ARROW keys to highlight one word at a time. Pressing CTRL+A will select all text in the active window.

Figure C shows an example of the "Copy" function being accessed and selected from the "Edit" drop-down menu in a word processing software application. This menu has been accessed using techniques described in Section 5-2.2.1.

In addition to being accessed via the "Edit" menu, the "Copy" function can be accessed using its standard keyboard equivalent for the Windows Operating System, CTRL+C, which has been displayed in the menu in addition to the menu item text, "Copy," and the icon that symbolizes the function.

Exhibit 5-2.2.5

Examples of Keyboard Access to Commonly Used Functions (p.2)

Figure D. Resizing a graphic using a mouse.

Figure D shows an example of resizing a graphic using a mouse. Here, a user clicks on the graphic to select it, then clicks and drags one of the control handles shown here in black on the border of the graphic.

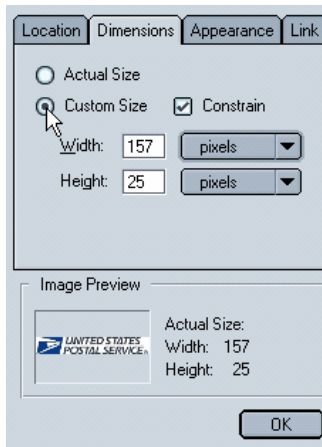


Figure E. Resizing the graphic shown in Figure D using a keyboard accessible control.

Figure E shows an example of resizing this graphic (the same one shown in Figure D) using a keyboard accessible control.

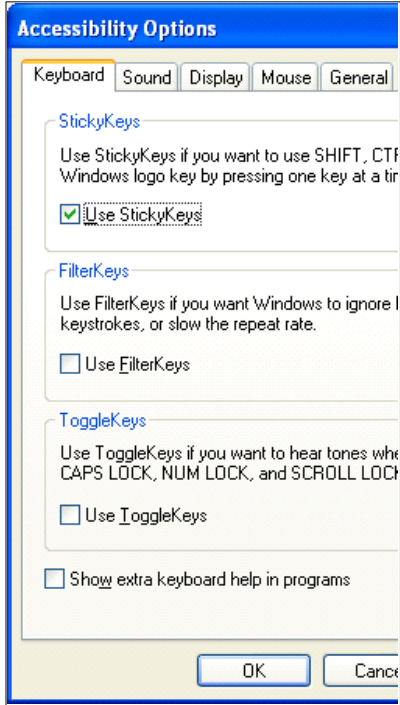
Although the process for resizing is different, the functionality provided is equivalent; the size change is reflected in the software application, regardless of whether the mouse or the keyboard-accessible control was used.

5-2.2.6 Support Latched and Locked Keyboard Access

Support keyboard equivalents that use operating system accessibility features that rely on latched and locked modifier keys (e.g., StickyKeys on the Windows platform). Developers must be aware of sequential keyboard access issues when creating nonstandard input routines. Beyond use of latched and locked modifier keys, appropriate on-screen focus and cursor representation must be provided (see Section 5-4, On-Screen Focus).

Exhibit 5.2.2.6

Example of Latched and Locked Keyboard Access

| | |
|---|--|
|  | <p>An example of the Windows XP™ Operating System's Accessibility Options control panel.</p> <p>The Accessibility Options control panel can be found under the Windows XP™ Start Menu: Settings: Control Panel. “StickyKeys,” “FilterKeys,” and “ToggleKeys” can all be activated using this control panel. Any Windows XP™ software application can detect and use these settings to provide users with keyboard accessibility options.</p> <p>Because users that need these features will probably not be using a mouse, Windows XP™ provides keyboard shortcuts that are enabled by default. The keyboard shortcut for “StickyKeys” is to press the SHIFT key five times.</p> <p>The keyboard shortcut for “FilterKeys” is to press and hold the SHIFT key for eight seconds. The shortcut for “ToggleKeys” is to press and hold the NUM LOCK key for five seconds. These default keyboard shortcuts can be disabled under advanced options using the Accessibility Options control panel.</p> <p>Although this example could also be used to illustrate activated accessibility features (section 5-3), the key concept is to be aware that keyboard access can perform actions equivalent to using a mouse.</p> |
|---|--|

5-2.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the software application without assistive technology to verify keyboard access. Unplug or disable all input devices except the keyboard, then attempt to access and operate the identified user interface elements that must be accessible using only the keyboard. See the references listed below for standard keyboard equivalents that should be tested on each platform. When nonstandard keyboard equivalents are used, ensure that they are communicated to the user via the application's user assistance. Whether using standard or nonstandard keyboard equivalents, the following keyboard operations should be tested:

- a. Navigate to, display, and select each menu and menu item with *keyboard equivalents*. This includes the menu bar, system menu, and context-sensitive menus.

- b. Access and select all functions provided on toolbars via *redundant* menu items or using *keyboard equivalents* (i.e., Alt+F4 or Ctrl+C). Ensure that all toolbar button functions can be performed using the keyboard.
- c. Move the focus between application windows, sections or panes of application windows, and modeless dialogs using standard *keyboard equivalents*.
- d. Move, resize, minimize, restore, maximize, scroll, and close windows using standard *keyboard equivalents*.
- e. Navigate logically to every *control* in application windows and dialogs, and operate all controls using standard *keyboard equivalents*.
- f. Perform functions that are normally provided through mouse operations, including commonly used commands such as text or object selection, clipboard commands (i.e., cut, copy, and paste) or graphic resizing using some keyboard access method (e.g., keyboard equivalents or menu items).

5-2.4 References

The following standard *access keys* and *key combinations* — which are normally specified in the platform's user interface style guide document — must be supported by software applications:

- Microsoft Windows Keyboard Design Guide
<http://www.microsoft.com/enable/products/winkeyboard.htm>
- Sun Java Application Design Guidelines: Keyboard Operations
<http://java.sun.com/products/jlf/ed2/book/HIG.Behavior3.html>
- Sun Java: Developing Accessible JFC Applications
<http://www.sun.com/access/developers/developing-accessible-apps/>
- Macintosh Human Interface Guidelines
<http://developer.apple.com/documentation/UserExperience/Conceptual/AquaHIGuidelines/index.html>
- UNIX Motif and CDE 2.1 Style Guide
<http://zikova.cvut.cz/publikace/aix/motif/motifsg/toc.htm>
- UNIX KDE User Interface Guidelines
<http://developer.kde.org/documentation/standards/kde/style/basics/index.html>
- Gnome/Linux Keyboard Navigation for Gtk+2.0 Draft
<http://developer.gnome.org/projects/gap/keyboardnav.html>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-3 Activated Accessibility Features

Software applications must not disrupt or disable activated features of other products that are identified as accessibility features, if those features are developed and documented according to industry standards. Software applications also must not disrupt or disable activated accessibility features of any operating system, if the application programming interface (API) for those accessibility features has been documented by the manufacturer of the operating system and is available to the product developer (Section 508, Provision §1194.21b).

5-3.1 Rationale

Assistive technology uses operating system accessibility features to provide information and feedback from software, making it easier for people with a variety of disabilities to use their computer. These accessibility features are activated and adjusted by the user and by assistive technology to make the on-screen focus, operation, and state of software components and information accessible via various input and output devices (e.g., keyboard, mouse, audio, or video).

For example, when a user tabs through an electronic form and the focus is on a radio button object, the user needs to know the following:

- That the object is a radio button.
- That the focus is on the radio button.
- That the radio button is selected.

Software applications must recognize and properly interact with the product or operating system's activated accessibility features without disrupting or disabling them. Software applications are required to use standard controls and reliable accessibility frameworks or application programming interfaces (APIs) that are documented by the manufacturer of the operating system or product.

Note that additional requirements for supporting user-selected display settings, which are often included in operating system accessibility features, are described in Section 5-8, User-Selected Display Attributes, Color and Contrast.

This accessibility requirement applies to **all** aspects of software application use including installation, operation, and removal.

5-3.2 Techniques

5-3.2.1 Provide Operating System Accessibility Features

Where possible, operating systems should provide accessibility features and application programming interfaces (APIs) for those features that make the operation and state of software application components and information accessible via various input and output devices (e.g., keyboard, mouse, audio, or video). The accessibility features and APIs should be documented by the manufacturer of the operating system so that software product developers can use them.

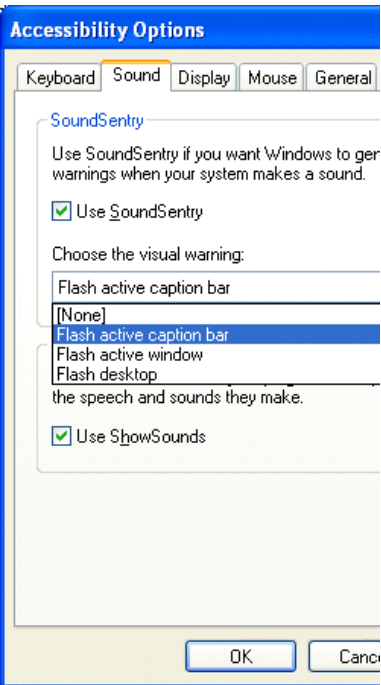
5-3.2.2 Support Accessibility Features Through Use of Standard Controls, Frameworks, and APIs

Where possible, use integrated standard operating system controls, frameworks, and APIs to provide object information, because they are integrated with operating system accessibility features. A control is defined as any user interface element or object that accepts input (i.e., menus, list boxes, and buttons). Use of integrated standard controls, frameworks, and APIs eliminates the need for additional programmatic work to expose an object's identity, role, and state. When using nonstandard controls, use reliable accessibility frameworks (or component object models) that use service interfaces, event systems, APIs, and proxies to provide object information for the nonstandard controls. Nonstandard controls must not disrupt or disable activated accessibility features. The information that must be provided about objects includes name, location, type, associated values, parent control, logical order for navigation, and event notifications, such as focus gain or loss.

5-3.2.3 Support Audio Accessibility Features

Provide support for operating system audio accessibility features. These operating system features display visual indicators or cues when sounds are generated by certain operating system or software application events (e.g., flashing backgrounds, message or dialog windows, status indicators in a taskbar, or text messages in a status window, etc.). When software applications employ audio alerts, redundant visual cues must be provided. Software applications that use nonstandard controls must not disable or disrupt activated accessibility features. Note that when flashing is used, refer to the frequency guideline in section 5-11.

Exhibit 5-3.2.3

Example of Audio Accessibility Features


An example of the audio accessibility options (“Sound”) in the Windows XP™ control panel. This control panel allows the user to set two kinds of preferences for audio accessibility, allowing software applications to convey information visually rather than by sound alone.

The first preference, “Use SoundSentry,” supports operating system visual indicators or cues when any sound is generated by the system. The possible visual indicators are a flashing of the active caption bar, the active window, or the entire desktop.

The second preference, “Use ShowSounds,” supports an operating system function that allows software applications to display captions (textual information) for the speech and sounds they make. With the “ShowSounds” accessibility feature, it is up to the software application to determine the current “ShowSound” setting and how to respond appropriately. The “SoundSentry,” on the other hand, automatically provides a visual indicator for all sounds sent to the internal PC speaker.

5-3.2.4 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the software application to verify compatibility with operating system (OS) accessibility features. For each OS the software application runs on, list the set of operating system accessibility features (e.g., keyboard, audio/sound, display, mouse/input, or general). Then, do the following for each accessibility feature:

- a. Turn on the operating system accessibility feature.
- b. Exercise all software application functions to verify that information about associated controls (identity, role, and state) is accessible. When the focus is on the object or control, the assistive technology should be able to access and state the object name, its role (type), its state, and its current value.
- c. Note any application function for which object or control name, role, state, and value is not accessible, or that disables, disrupts, or interferes with OS accessibility features.
- d. Fix any functions that disable or interfere with OS accessibility features, then repeat this test to verify that the functions do not disable or interfere with OS accessibility features.

- e. If object or control information remains inaccessible to the operating system and assistive technology, or if it continues to disable, disrupt, or interfere with activated accessibility features, fix then retest using this procedure.

5-3.3 References

- Microsoft Active Accessibility
<http://msdn.microsoft.com/library/default.asp?url=/nhp/default.asp?contentid=28000544>
- Microsoft Developer Network: Accessibility Information for Developers
<http://msdn.microsoft.com/at/>
- IBM Guidelines for “Java Accessibility API using JFC/Swing components or Custom Components”
<http://www-3.ibm.com/able/guidelines/java/accessjava.html>
- GNOME User Environment Accessibility Project.
<http://developer.gnome.org/projects/gap/>
The Accessibility Framework includes an Accessibility Toolkit Application Programming Interface and an Assistive Technology Service Provider Interface.
- Sun Java: Developing Accessible JFC Applications
<http://www.sun.com/access/developers/developing-accessible-apps/>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-4 On-Screen Focus

Operating systems and software applications must provide a well-defined on-screen indication of the current focus that moves among user interface elements as the input focus changes. The focus must be programmatically exposed, so that assistive technology can track focus and focus changes (Section 508, Provision §1194.21c).

5-4.1 Rationale

The position on a screen where an action can occur is referred to as the focus. For example, when an item in a software application’s menu bar is highlighted, this indicates that if the user clicks the mouse or presses the ENTER key, the associated feature will be invoked and that item has the focus. Providing a visual focus indicator — referred to as a cursor — allows someone to use a software application effectively. When a software application is being used by a person running assistive technology — especially those with visual or mobility impairments — the assistive technology must be able to discern and track the focus, so that it can describe, magnify, or manipulate the object for the user (e.g., a screen reader can translate information about the focused object into voice output).

Software applications must allow assistive technology to track the focused object and focus changes by programmatically exposing information about focused objects available to assistive technology. Software applications must also provide a visual indicator or cursor that identifies where the focus is, or where an action will occur if an input event (e.g., mouse click or keystroke) takes place.

5-4.2 Techniques

5-4.2.1 Use Standard Controls to Expose Focus Information

Whenever possible, software applications must use standard controls to allow operating system accessibility features and assistive technology to access and track system focus. If nonstandard controls must be used, expose focus information to the operating and assistive technology and provide standard cursor representations.

Exhibit 5-4.2.1

Example of Using Standard Controls to Expose Focus Information

| | |
|---|--|
| <p>Whenever possible operating system a</p> | <p>Some examples of using standard controls to expose focus information in the Microsoft Windows Operating System. Windows® provides built-in support (through Microsoft Active Accessibility or MSAA) for focus cursor tracking and other accessibility features. Windows®-based software applications should use standard user interface objects or controls (e.g., buttons, lists, or menus) to make focus information accessible to assistive technology. Also, the cursor representation can be programmatically controlled with appropriate API calls.</p> |
| <p>Figure A. The focus information exposed in text input mode.</p> | <p>For example, in Figure A, the focus information is exposed in a standard control during text input or edit mode. The text cursor (the blinking “I” bar) is appropriately displayed to indicate the point where text input will occur.</p> |
| <p>input event (e 4-4.2 Techniqu 4-4.2.1 Expose Focu</p> | <p>In Figure B, the focus information is exposed in the same standard control during a text selection and movement activity. Here, the user has selected the text surrounded by a black solid fill and then moved the input cursor to the new insertion point indicated by the dotted “I” bar cursor. This can be done either by dragging the mouse or selecting the F2 key and moving the input cursor using the ARROW keys.</p> |
| <p>Figure B. The focus information exposed in text selection/ movement mode.</p> | <p>In Figure C, the focus information is exposed during a “File: Save” operation, when the system is busy and cannot accept user input. The cursor representation, an “hourglass” cursor, has been changed to indicate a “system busy” state.</p> |
| <p>4-4.2.1 Expose Focu Whenever poss operating syste system focus. I</p> | |
| <p>Figure C. The focus information exposed in “system busy” state.</p> | |

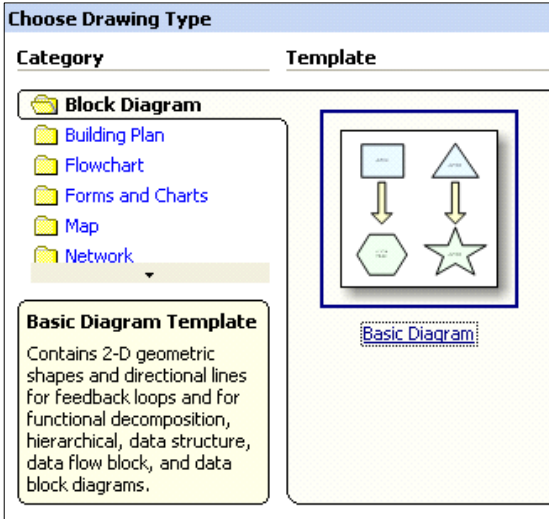
5-4.2.2 **Expose Information for Associated Controls**

When a control is associated with another control or object (i.e., when interaction with one control affects another control or object), expose the information about each control to assistive technology. Visually impaired users may not be aware of on-screen changes resulting from the operation of a given control changes another control or object associated with the control the user operated. In this example, the software application must make sure the operating system is instructed properly that the change occurred so that any activated accessibility features or assistive technologies can process the change. This instruction is critical since the cursor moves with the system focus. In addition, associated controls can sometimes provide an automatic focus change (i.e., movement of the focus based on user operation of a control without additional user input such as a mouse click or keystroke).

This automatic focus change can be confusing to all users, especially people with visual impairments. When the focus is automatically changed, it is critical that associated information about changed, associated controls is exposed to assistive technology via the operating system (this exposure will also allow the operating system to move and or change the cursor).

Exhibit 5-4.2.2

Examples of Exposing Information for Associated Controls



Choose Drawing Type

| Category | Template |
|----------------------|----------------------|
| Block Diagram | Basic Diagram |
| Building Plan | |
| Flowchart | |
| Forms and Charts | |
| Map | |
| Network | |

Basic Diagram Template
Contains 2-D geometric shapes and directional lines for feedback loops and for functional decomposition, hierarchical, data structure, data flow block, and data block diagrams.

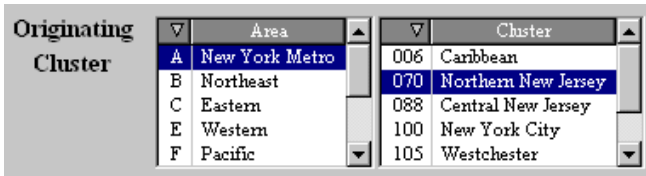
Some examples of exposing information about associated controls to assistive technology.

Figure A shows a “Choose Drawing Type” dialog window for a diagramming software application. Here, the user has selected a drawing category as indicated by the boldface text, surrounding outline and open folder icon on the text “Block Diagram.”

Once a drawing category has been selected, drawing templates for that category appear to the right of the category listing. Here, the user has clicked the mouse or used the TAB key to select the “Basic Diagram” template. The focus is on this template object as indicated by solid blue line surrounding the template icon and the dotted line surrounding the text “Basic Diagram.”

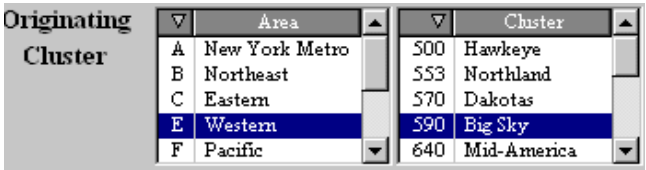
While the focus remains on this template object, an associated control displays a description of this template and is accessible to assistive technology.

Figures B and C show sets of grouped controls from a Postal Service executive reporting application.



| Originating Cluster | Area | Cluster |
|---------------------|----------------|-------------------------|
| A | New York Metro | 006 Caribbean |
| B | Northeast | 070 Northern New Jersey |
| C | Eastern | 088 Central New Jersey |
| E | Western | 100 New York City |
| F | Pacific | 105 Westchester |

In **Figure B**, a user has selected the “New York Metro” Area in the “Area” list box. Upon doing so, associated clusters are dynamically updated and displayed in the “Cluster” list box (e.g., Caribbean, Northern New Jersey, etc.).



| Originating Cluster | Area | Cluster |
|---------------------|----------------|-----------------|
| A | New York Metro | 500 Hawkeye |
| B | Northeast | 553 Northland |
| C | Eastern | 570 Dakotas |
| E | Western | 590 Big Sky |
| F | Pacific | 640 Mid-America |

In **Figure C**, a different area, “Western,” has been selected by the user, and a different set of associated clusters are dynamically updated and displayed in the “Cluster” list box (e.g., Hawkeye, Northland, Dakotas, Big Sky, etc.).

In each case, both the on-screen focus and textual information for both list box selections must be made accessible to assistive technology.

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5-4.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the software application or operating system with and without assistive technology to verify that the on-screen focus is well defined.

- a. Using only the keyboard and keyboard equivalents, navigate through the user interface of the operating system or software application (i.e., windows, menus, toolbars, and controls) to ensure that the focused object is tracked and that an appropriate operating system- standard cursor or highlight element is displayed for the various focused objects.
- b. Use a screen reader to navigate through the user interface of the operating system or software application (i.e., windows, menus, toolbars, or controls) to ensure that the focused object is tracked and that a appropriate object information is read by the screen reader for the various focused objects. When the focus is on the object or control, the assistive technology should be able to access and state the object name, its role (type), its state, and its current value.
- c. Use a screen magnifier to navigate through the user interface of the operating system or software application (i.e., windows, menus, toolbars, or controls) to ensure that the focused object is tracked and that an appropriate operating system standard cursor is displayed for the various focused objects.
- d. Note any objects for which focus is not tracked, the object name, role, state, and value of which are not accessible to assistive technology, or which display an inappropriate standard cursor.
- e. For the objects in question, fix then retest using this procedure.

5-4.4 References

- Microsoft Active Accessibility
<http://msdn.microsoft.com/library/default.asp?url=/nhp/default.asp?contentid=28000544>
- Sun Java: Developing Accessible JFC Applications
<http://www.sun.com/access/developers/developing-accessible-apps/>
- UNIX/Linux GNOME User Environment Accessibility Project
<http://developer.gnome.org/projects/gap/>
The accessibility framework includes an accessibility toolkit application programming interface and an assistive technology service provider interface.

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-5 User Interface and Programmatic Elements

Sufficient information about a user interface element including the identity, operation, and state of the element must be available to assistive technology. When an image represents a program element or control, the information conveyed by the image must also be available in text as described in 5-7, Provision (f), Textual Information (Section 508, Provision §1194.21d).

5-5.1 Rationale

People with disabilities use a computer with the aid of assistive technology such as a screen reader, screen magnifier, or Braille display. Assistive technology must be able to discern and track information about objects accessible to it so it can describe, magnify, or manipulate the object for the user (e.g., a screen reader can translate information about the focused object into voice output). To do so, assistive technology must be able to inform the user of the existence, location, role, and status of controls such as menus, toolbars, and other inputs (i.e., text inputs, checkboxes, radio buttons, or drop-down or list selectors).


Software applications must — using program code and user-visible text — provide information about all user interface elements so an assistive technology can locate and track the focus and tell the user what the focus object (identity) is as well as its role (operation), and state. For example, if you TAB through a form and focus is on a radio button, you need to know it is a radio button and whether or not it is selected.

5-5.2 Techniques

5-5.2.1 Use Standard UI Controls

Use standard controls to provide both displayed and underlying information about controls. Standard controls eliminate the need for additional development or programming to expose the information about the control's identity, role, and state (via text) to the operating system and to assistive technology. Information about controls is both displayed to the user (e.g., meaningful "ToolTips" or captions or meaningful window titles) and provided programmatically to assistive technology (e.g., windowing events, control role, or control state). This includes all window information (i.e., user-visible and underlying window titles or names), menu information, and toolbar information (i.e., user-visible or underlying alternate text description).

Exhibit 5-5.2.1
Use Standard UI Controls Example



An example of using standard user interface controls to make UI and programmatic elements accessible to assistive technology.

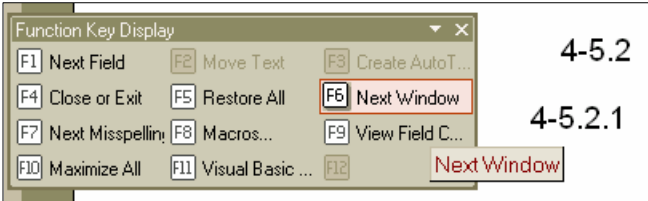
This figure shows a “Security Warning” dialog box that is invoked by a Web browser software application that uses standard user interface controls. Because standard controls have been used properly, this dialog box is accessible to assistive technology. A screen reader would read the Window title, then the text of the warning message, the check box label (“Always trust content from Sun Microsystems, Inc.”) and each label for the three push buttons (“Yes”, “No”, “More Info”).

In addition, the default selection or focused object, the “No” button, is indicated clearly and available to assistive technology.

5-5.2.2 **Use Reliable Accessibility Frameworks for Nonstandard Controls**

When no other option is available, nonstandard controls must use reliable accessibility frameworks (or component object models) that use service interfaces, event systems, APIs, and proxies to provide object information to assistive technology.

Exhibit 5-5.2.2
Example of Using Reliable Accessibility Frameworks for Nonstandard UI Controls



4-5.2

4-5.2.1

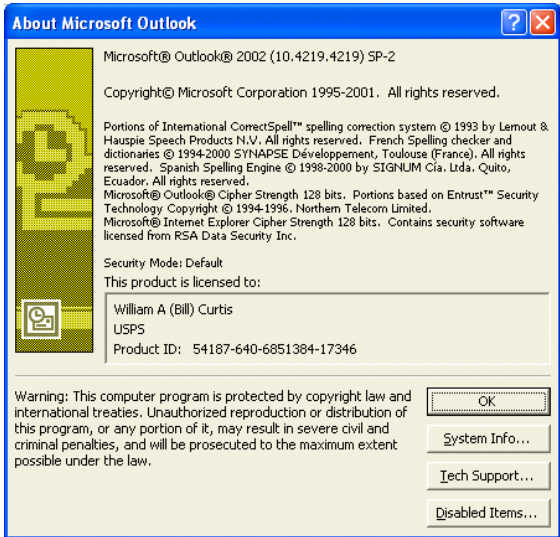
An example of using reliable accessibility frameworks to make information about nonstandard user interface controls accessible to assistive technology.

This figure shows a floating toolbar in a word processing application. This toolbar uses nonstandard controls, but the information about the controls including their name, state, and value are accessible to assistive technology. For example, the highlight and line around the “F6-Next Window” object indicate that it has focus, and the label or Tooltip of “Next Window” would be read by a screen reader.

5-5.2.3 **Make Other Key UI Objects Accessible**

Other user interface objects that are critical to the use of an application (i.e., images of text in a password-locked screen, an “About this Software,” or other dialog box) must be accompanied by an accessible alternate text, equivalent in content and meaning.

Exhibit 5-5.2.3 Example of Key UI Object Accessibility



An example of an “About this Software” dialog box that provides critical application version information.

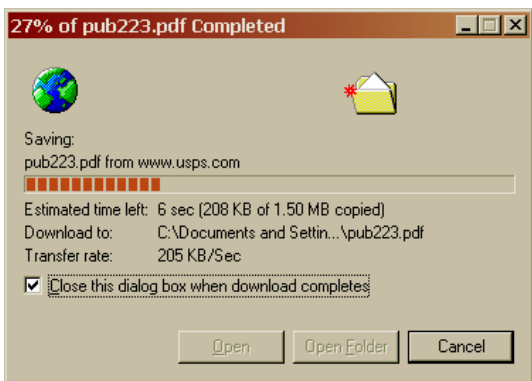
This dialog box provides version information that can be critical when needed for user support and upgrade assistance. The dialog box contains both graphical and textual information (including a version number) that is accessible to assistive technologies.

Other key user interface objects that should be tested for accessibility are startup or “splash” screens and security login dialogs such as password-locked screensavers.

5-5.2.4 Make Information About Changed Images Accessible

When system or application events cause an image to change automatically, expose the information about the changed image to assistive technology. Once this information is exposed, the operating system can allow activated accessibility features or assistive technology to process the change. If this is not possible, the software application must provide an alternate method to indicate the image change (i.e., use of a dialog window with accessible textual information that communicates the change).

Exhibit 5-5.2.4 Example of How to Make Changed Images Accessible



An example of making changed image information accessible.

This figure shows a dialog window that communicates progress toward completion of a download from a Web browser application. This window is frequently invoked when users download files from the Internet, and it receives the on-screen focus when the download is initiated. Sighted users can see the progress via the graphical progress bar, the rectangular bar shown in the middle of this dialog with solid squares inside it.

A user of a screen reader hears the progress percentage as this window updates the textual information (shown in the window title and next to the “Estimated time left” element). This text is updated constantly as the system redraws the progress bar, ensuring the accessibility of the progress information.

5-5.2.5 **Use Caution with Timeouts, Automatic Updates, and Refreshes**

Some operating systems and software applications require that users respond or be active within a certain time limit to provide security and other features. When the time limit expires, a “timeout” can result, which can, in turn, cause an automatic refresh, an update of screen content, a redirection to another resource, a termination of a secure session, a disconnection, or a standby status due to resource limits.

Users with disabilities may require additional time to navigate, perform functions, and read information provided by operating systems and software applications. When a system or application uses a timeout, the timeout information should be provided to the user before use of the application.

Screen content must not be automatically updated or refreshed unless the update is based on a user selection or user notification that an update is going to occur. Resetting an application to an initial state or resets resulting from automatic screen updates should include an informative error message, if possible.

USPS Information Technology ACE Platform operating system and applications requiring the use of an inactivity timeout timer will obtain the timer settings from a global parameter defined nationally. This global parameter must not identify users by their disability or by and other personal information. Refer to *ACE Standards & Guidelines* for more information. Web-based applications have specific timeout requirements addressed in Section 6-16, Timed Responses.

Exhibit 5-5.2.5

Example of Timeout Security Dialogs for an Operating System



Figure A. The “Unlock Computer” dialog window in Windows 2000 Professional Operating System.

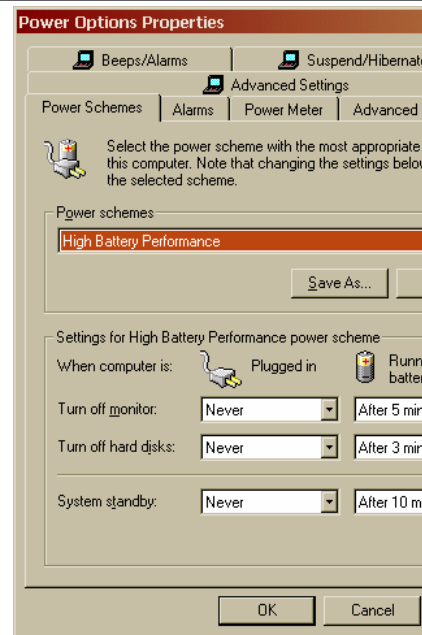


Figure B. Setting the Power Options in Windows 2000, which also determines lockout settings.

Some examples of a timeout security dialog for an operating system.

Figure A shows the Windows 2000 Professional “Unlock Computer” dialog box. This computer is in use and has been locked after “timing out” based on some system standby settings provided by the operating system.

Figure B shows the Windows 2000 “Power Options” control panel, where the user may adjust the inactivity period that the operating system will use to set the secure timeout of the system and display.

5-5.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the software application or operating system with assistive technology to verify that both underlying (programmatic) and user-visible information about user interface elements is both accessible and meaningful.

- a. Use a screen reader to navigate through the user interface of the operating system or software application (i.e., windows, menus, toolbars, controls) to ensure that the focused object is tracked and that appropriate object information is read by the screen reader for the various focused objects. When the focus is on the object or control, the

- assistive technology should be able to access and state a meaningful object name, its role (type), its state or its current value.
- b. Perform the same tests listed above using a screen magnifier to ensure that the application can be magnified.
 - c. Note any object for which focus is not tracked, or for which a meaningful object name, role, state and value is not accessible to assistive technology.
 - d. For the objects in question, fix then retest using this procedure.

5-5.4 References

- Microsoft Active Accessibility
<http://msdn.microsoft.com/library/default.asp?url=/nhp/default.asp?contentid=28000544>
- Sun Java: Developing Accessible JFC Applications
<http://www.sun.com/access/developers/developing-accessible-apps/>
- UNIX/Linux GNOME User Environment Accessibility Project
<http://developer.gnome.org/projects/gap/>
The Accessibility Framework includes an Accessibility Toolkit Application Programming Interface and an Assistive Technology Service Provider Interface.
- USPS Information Technology ACE Standards & Guidelines
http://it.usps.gov/pls/itprodnp/page?psite_id=10&pnode_id=273

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-6 Consistent Use of Images

When images are used to identify or represent controls, status indicators, or other user interface or programmatic elements, the meaning assigned to those images must be consistent throughout a software application (Section 508, Provision §1194.21e).

5-6.1 Rationale

Images can represent concepts or user interface elements within a software application (e.g., file folder, slider bar, or hourglass). Consistent use of images is critical for users to understand their meaning. The user-visible textual information (i.e., “ToolTips,” alternative text) presented with images must also be consistent throughout the software application (i.e., “file folder” icon must have the same meaning and label throughout to indicate a function such as “open file”).

Changing an image to identify status or events can be confusing to users and to assistive technology. When such changes occur, software applications must provide textual information about the change, using program code and

user-visible text. The techniques in Section 5-5, User Interface and Programmatic Elements, describe ways to provide this textual information.

5-6.2 Techniques

When an image identifies a user interface element (or application function), the meaning assigned to that image must be consistent throughout the application. In addition, consistent textual information (i.e., a label or description) must be provided and must be consistent in meaning.

Exhibit 5-6.2.1

Example of Consistent Meaning of Images

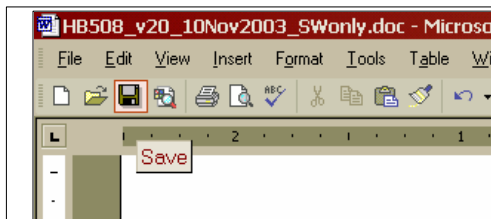


Figure A. The “Save” icon in a toolbar used by a word processing application.

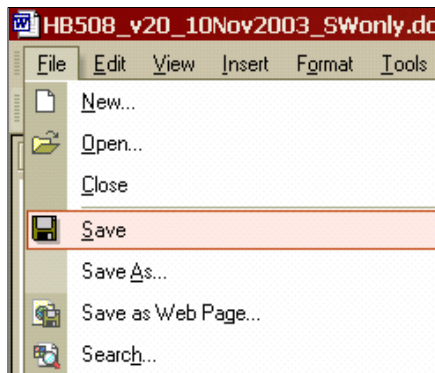


Figure B. The same “Save” icon is used in the word processor’s “File” menu.

An example of consistent meaning of images used in the user interface of the Microsoft Word™ word processing application.

In **Figure A**, a highlighted “Save” button is shown in a toolbar used the word processing application. The “Save” button uses an image of a floppy disk to represent the concept of saving a file.

As shown in **Figure B**, the word processing application consistently uses the same floppy disk icon in its “File” menu, under both the “Save” and “Save as Web Page” menu items.

This icon is used also throughout the Microsoft Windows Operating System. This consistent use of both the floppy disk icon and the image’s label of “Save” allow the user to understand the image’s meaning in both the operating system and within applications such as this word processor.

5-6.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the software application or operating system with and without assistive technology to verify that images and their labels are consistent and meaningful.

- a. List all images used in the user interface to represent a control or provide access to a tool, including their associated label. Identify the application functions associated with them.

- b. Navigate the software application through usage scenarios and identify where the same image or label appears in different phases of the scenarios.
- c. For duplicate images and labels, note where the image or label represents different application functions.
- d. For duplicate images and labels that represent different functions, resolve the difference by changing image(s) and/or label(s) to ensure that the same image does *not* represent different functions.
- e. Repeat steps b through d with screen reader and screen magnifier assistive technology, to ensure that the labels for images are stated (i.e., read) and that they are consistent and meaningful. When the focus is on the image object, the assistive technology should be able to access and state a meaningful object name, its role (type), its state, or its current value. Note any images functioning as an user interface object for which a meaningful object name, role, state, or value is not accessible to assistive technology.
- f. For the image objects in question, fix then retest using this procedure.

5-6.4 References

- Sun Java Look and Feel Design Guidelines: Application Graphics
<http://java.sun.com/products/jlf/ed2/book/HIG.Graphics.html>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-7 Textual Information

Software applications must provide textual information using operating system functions for displaying text. The minimum information that must be made available is text content, text cursor location, and text attributes (Section 508, Provision §1194.21f).

5-7.1 Rationale

The operating system is the “core” computer software that controls basic functions, such as receiving information from the keyboard, displaying information on the computer screen, and storing data on the hard disk. Other software applications — including assistive technology — use the standard protocols dictated by the operating system for displaying their own information or processing the output of other computer programs. For example, assistive technology will use operating system standard protocols to track the location and placement of both text and graphics, understand the attributes of text (i.e., dialog title, font, size, color, and style), and watch information being copied from one location to another (i.e., information being erased or overwritten by other text or graphics).

When software applications use nonstandard protocols for writing text on the screen or use graphics, assistive technology may not be able to interpret the information. This guideline does not prohibit or limit an application programmer from developing unique display techniques. It requires that when a unique method (i.e., a nonstandard protocol) or nonstandard text control is used, the text should also be written to the screen through standard operating system functions for displaying text.

5-7.2 **Techniques**

5-7.2.1 **Use Standard OS Functions to Provide Textual Information**

Use standard operating system and application API calls to provide text to any user interface or programmatic elements. Standard operating system API calls eliminate the need for additional development or programming to expose text information, name, identity, role, and state to the operating system for use by assistive technology.

Textual information refers to both the text provided to or manipulated by the user (e.g., text input boxes, text displays, tool tips, captions, window titles, dialog text content, copied text, or “about this software” text information) and to textual information provided programmatically through the operating system for use by assistive technology.

When no other option is available, refer to the techniques stated in Section 5-5, User Interface and Programmatic Elements, regarding nonstandard controls. For nonstandard text display, make text attributes (i.e., character set, font, size, color, or style) available to the operating system for use by assistive technology.

Exhibit 5-7.2.1

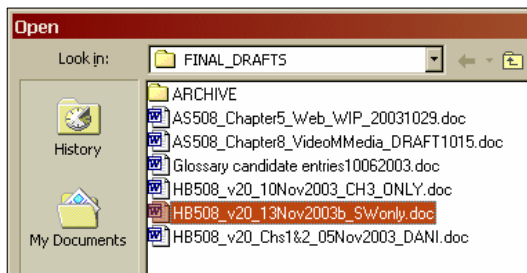
Example of Using Standard OS Functions to Provide Textual Information

Figure A. A standard dialog window that provides accessible textual information.

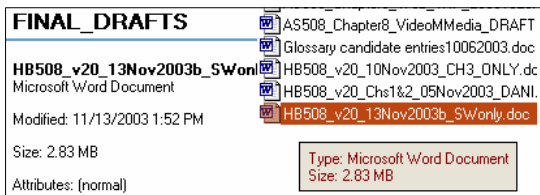


Figure B. A standard file browser window that provides accessible textual information about listed documents.

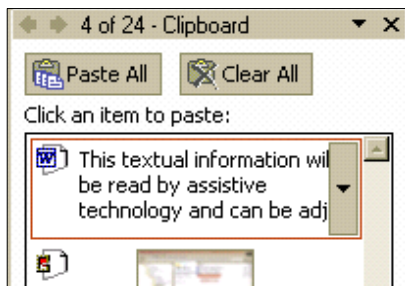


Figure C. Accessible textual information that has been copied to the operating system's clipboard.

An example of using standard OS functions to provide textual information. Textual information refers to both the text provided to or manipulated by the user (e.g., text input boxes, text displays, tool tips, captions, window titles, dialog text content, copied text, or “about this software” text information) and to textual information provided programmatically through the operating system for use by assistive technology.

Figure A shows a standard dialog window that allows users to open a file. In this dialog window, the window title (“Open”), the folder name (“FINAL_DRAFTS”), and the filenames (e.g., “HB508_v20_13Nov2003b_SWonly.doc”) are accessible textual information.

Figure B shows a standard file browser window. The textual information for the listed documents is accessible as textual information. This includes filenames and meta information, such as file type and file size (shown here in the ToolTip that is floating near the selected file).

Figure C shows a view of an operating system-level clipboard to which document objects, graphics, and text have been copied. The item surrounded by a solid orange line (i.e., “This textual information...”) provides accessible textual information.

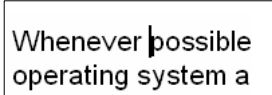
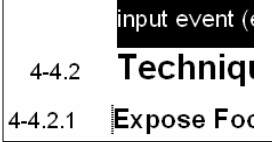
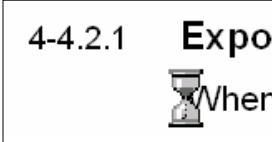
All accessible textual information can be read by assistive technology and can be adjusted by the user’s operating system level display preferences (i.e., colors, fonts, etc.).

5-7.2.2 Make Text Cursor Information Accessible

Software applications must make text cursor (i.e., system text caret) information available to the operating system for use by assistive technology. Assistive technology (e.g., screen readers or screen magnifiers) needs to know the position and contents of the focused object, so it can describe, magnify, or manipulate the object for the user. For additional techniques, refer to Section 5-4, On-Screen Focus.

Exhibit 5-7.7.2

Examples of Making Text Cursor Information Accessible

| | |
|---|--|
|  | <p>Some examples of making text cursor information accessible in the Microsoft Windows Operating System. Windows™ provides built-in support (through Microsoft Active Accessibility or MSAA) for focus cursor tracking and other accessibility features. Windows™-based software applications can use MSAA and appropriate API calls to make focus information accessible to assistive technology and to control the cursor representation programmatically. Using standard cursor controls allows the OS to indicate to the user what tasks can be performed.</p> |
|  | <p>For example, in Figure A, the text cursor (the blinking “I” bar) is appropriately displayed during text input mode to indicate the point where user input will occur.</p> |
|  | <p>In Figure B, the text cursor indicates both the selected text region (the region surrounded by a black solid fill) and the new insertion point indicated by the dotted “I” bar cursor.</p> <p>In Figure C, the text cursor indicates that the system is busy and cannot accept user input. The cursor representation, an “hourglass” cursor, has been changed to indicate a “system busy” state.</p> |

5-7.3 **Testing**

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the software application with assistive technology to verify that text information in all client windows is accessible.

- a. Navigate the software application using a screen reader (e.g., JAWS) through usage scenarios that cover all core functionality for the software application.
- b. As you do, verify that the screen reader reads and provides meaningful information about text elements in all client windows (text content, text cursor location, and text attributes).
- c. Verify that “About” information for the software application (i.e., software version, serial number, etc.) is accessible. This information is often critical basic information for use of software, including customer support. It is often located either in an “About” dialog box, or on a “splash” screen, or both.
- d. Document which text elements are not accessible via the screen reader, including text content, text cursor location, and text attributes.
- e. For the text element(s) in question, fix, then retest using this procedure.

5-7.4 References

- Microsoft Input Method Editor and Text Services Framework Accessibility
http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnacc/html/ATG_TSF.asp
- Sun Java: Developing Accessible JFC Applications
<http://www.sun.com/access/developers/developing-accessible-apps/>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-8 User-Selected Display Attributes, Color, and Contrast

Software applications must not override user-selected contrast and color selections and other individual display settings (i.e., color schemes and background patterns that provide sufficient contrast, fonts, and sizes for the display of user interface elements). When a software application permits a user to adjust color and contrast settings, a variety of color selections capable of producing a range of contrast levels must be provided (Section 508, Provision §1194.21g and Provision §1194.21j).

5-8.1 Rationale

People who cannot differentiate between certain color combinations or have some other visual impairment may have difficulty navigating or interpreting software application or operating system content that depends on the ability to identify color or differentiate between colors with low contrast (i.e., when foreground and background colors are too close to the same hue or value). People who are sensitive to bright displays or who cannot focus on a bright screen need color choices that provide a softer background and appropriate foreground color. Persons with disabilities often increase their efficiency with a system by selecting operating system-level display settings that affect the presentation of user interface elements (e.g., windows, menus, toolbars, icons, standard controls, or display resolution).

Software applications must use standard display protocols to inherit operating system-wide display settings, offering the user a consistency of presentation in the user interface. When a software application disables or interferes with these operating system-wide settings, the system's accessibility is reduced. When software applications offer nonstandard display options, there must be an option that allows the user to use whatever settings are already in place (i.e., operating system-level display settings) instead of application nonstandard display settings. For example, the application can offer a checkable menu item called "Use System Display Settings" under a "View" or "Options" Menu. When software applications allow users to customize colors,

the application must provide more than just a variety of color choices. The color choices must provide different levels of contrast.

5-8.2 **Techniques**

5-8.2.1 **OS-Level and Application Display Settings**

Design software applications so that they inherit operating system (OS)-level display settings. These settings can be selected by the user and include color schemes and background patterns that provide sufficient contrast, fonts, and sizes for the display of user interface elements (e.g., windows, menus, toolbars, icons, standard controls, or display resolution). When some controls (e.g., menus) inherit these display settings, they can be resized automatically (e.g., application menus or contextual menus can expand to display menu items in the user-selected font and font size).

If a software application overrides these user-selected OS-level display settings or provides nonstandard display settings, the application must allow the user to select these settings within the application. These application-level settings must include the minimum display options offered by the operating system (e.g., a choice of color schemes that provide sufficient contrast between colors, fonts, or sizes).

Avoid use of fixed-size windows and dialog boxes. Provide options for either scaling the contents of windows or displaying more information in an alternate view. Also, use scroll bars for windows or individual controls when the content will no longer fit in the window. Do not display images behind or over text, as users in high-contrast settings cannot view them.

Exhibit 5-8.2.1

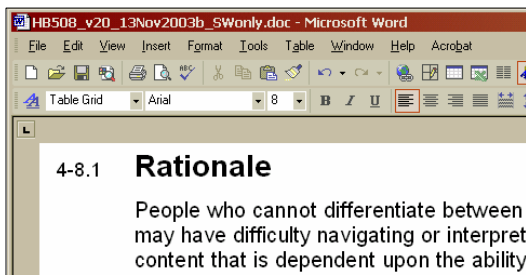
Example of OS-Level and Application Display Settings

Figure A. An application inherits a rich, non-high contrast color scheme from the OS display settings.

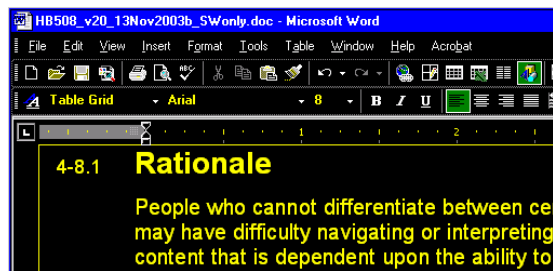


Figure B. The same application inherits a “black” high-contrast color scheme from the OS display settings.

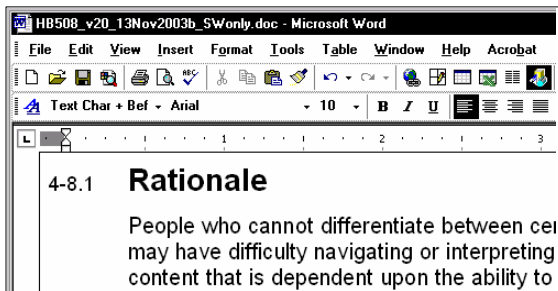


Figure C. The same application inherits a “white” high-contrast color scheme from the OS display settings.

An example of a word processing application that is designed to inherit the Microsoft Windows Operating System’s display or appearance settings. The Windows™ display settings can be accessed by either opening the “Display” Control Panel or by right-clicking on the desktop and choosing “Properties” or “Advanced Options.”

Figure A shows a word processing application that is inheriting a rich, low-contrast color scheme that has been set by the user in the Windows™ Operating System’s “display” control panel.

In **Figure B**, the same word processing application’s user interface presentation has been changed based on the user’s selection of a “black” high-contrast color scheme that is available in the operating system’s “display” control panel.

In **Figure C**, a different high-contrast display setting — this time a “white” based setting — has been selected by the user and is inherited by the word processing application.

Windows™ application developers can support inheritance of user-selected display settings in applications they develop by using the MFC library or Windows API.

5-8.2.2 Use Appropriate Color Combinations

Operating systems and software applications should avoid using color combinations that commonly are problematic for people who cannot differentiate between certain color combinations or who have other visual impairments. Do not use the following color combinations: green and red, green and blue, red and brown, and white and light green. Instead, use color combinations that differ significantly in hue, intensity, and value and provide sufficient contrast.

Exhibit 5-8.2.2
Selecting Appropriate Color Combinations



Figure A. A color wheel that can be used to select appropriate color combinations.

When developing the design of user interface elements, designers can use the color wheel shown in **Figure A**.

Combining dark hues from the bottom half of this color wheel with a lighter color from the top half of the wheel will generally result in a more effective color combination. This works well, except when the combination is one of the problematic ones listed in section 5-8.2.2.



Figure B. An appropriate color combination that provides sufficient contrast.

For example, **Figure B** pairs dark violet (from the bottom part of the wheel) with light gold (from the top part of the wheel). This results in an appropriate color combination that provides sufficient contrast, as demonstrated by the translation to grayscale shown below the color version.



Figure C. An inappropriate color combination that does not provide sufficient contrast.

Avoid combinations that pair light colors from the bottom half of the wheel with dark colors from the top half. For example, **Figure C** pairs light red (from the bottom half of the circle) with dark green (from the top half of the circle).

This color combination does not provide sufficient contrast, as demonstrated by the translation to grayscale shown below the color version. In addition, it is a red/green combination, one of the combinations should be avoided as described in section 5-8.2.2.

5-8.2.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the software application without assistive technology to verify that the application inherits operating system-level display settings.

- a. Access the operating system display preferences and select values for various individual display attributes (e.g., large fonts, nonstandard foreground, background, window element colors, and high contrast).
- b. Navigate the software application (manually or using a test suite) through usage scenarios that cover all core functionality for the software application.
- c. As you do, verify that the operating system-level display settings are maintained (i.e., color, contrast, background patterns, fonts and font sizes for windows, menus, toolbars, icons, standard controls, and display resolution). If the application supports a magnification or zoom function, verify that the display settings are maintained while being magnified.
- d. Note and document any user interface elements or areas of the application that disable or change the display attributes without selection by user.
- e. If the application offers nonstandard display settings, verify that a “Use System Display Settings” option is available. Also, verify that the application offers at least three custom display settings that provide high contrast and at least one custom display setting that provides a soft background with low contrast.
- f. Ensure that problematic color combinations (green and red, green and blue, red and brown, and white and light green) are not used. Check the combinations used by setting the operating system or monitor display settings to high contrast. Often, these settings are located in the operating system’s accessibility features, display appearance, or both.
- g. Replace any problematic combinations with combinations that provide sufficient contrast (i.e., combinations that differ significantly in hue, intensity, and value).

5-8.3 References

- Web/Computer Color Chart for the Color Blind
<http://www.toledo-bend.com/colorblind/colortable.html>
- Considering the Color Blind: Web Techniques
<http://www.webtechniques.com/archives/2000/08/newman/>
- Microsoft Developer Network: "Can Color Blind People See Your Site?"
<http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnhess/html/hess10092000.asp>
- Human-Computer Interaction Resource Network: Color Vision Deficiencies
<http://www.hcirn.com/atoz/atozc/cvd.php>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-9 Animation

When animation is displayed, the information must be displayable in at least one nonanimated presentation mode at the option of the user (Section 508, Provision §1194.21h).

5-9.1 Rationale

Animations that are controlled and displayed by software applications or operating systems (e.g., animated push-button controls or status indicators) are difficult for assistive technology to interpret. They can therefore pose serious problems for users that rely on screen readers or other assistive technology.

Software applications and operating systems must ensure that animated user interface elements are displayable in at least one nonanimated presentation mode. To do so, applications must offer a disable feature or an alternate format or access method for all animated user interface elements.

This guideline pertains to animated user interface elements displayed or controlled by the software application or operating system. Additional guidelines that relate to animation are in Chapter 6, Web-Based Intranet and Internet Information and Applications and Chapter 8, Video and Multimedia Products.

5-9.2 Techniques

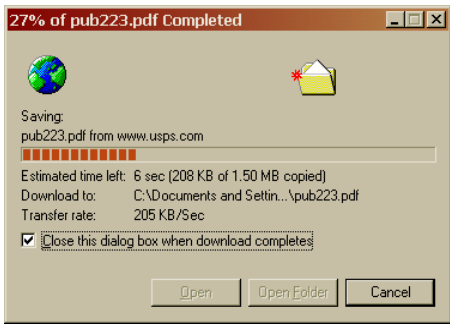
5-9.2.1 Provide Alternate Formats or Access Methods for Animated Elements

When operating systems or software applications use animated user interface elements to convey meaning, they must offer nonanimated alternate formats that provide equivalent information (e.g., user-visible or programmatically accessible textual information). Decorative animated user interface elements (e.g., visual transition effects or menu animation) do not require an alternate format if they are not used to convey meaning.

If animated user interface elements are used as a control or as an “access method” (e.g., the Microsoft Windows Office Assistant described in exhibit 5-9.2.2), the operating system or software application must offer an alternate access method. For example, the Microsoft Windows Office Assistant described in exhibit 5-9.2.2 offers a redundant way to access the main help system that can also be accessed by pressing the F1 key or by selecting from the “Help” menu.

Exhibit 5-9.2.1

Example of Alternate Formats or Access Methods for Animated Elements



An example of providing alternate formats for animated user interface elements. This figure shows a dialog window that communicates progress towards completion of a download from a Web browser application. This window is frequently invoked when users download files from the Internet. Sighted users can see the progress via the animated progress bar, the rectangular bar shown in the middle of this dialog with solid squares inside it. There is also an animation that depicts information moving from the Internet (represented by the world icon) to a folder on the user’s hard drive.

A screen reader user hears the progress percentage as this window updates the textual information shown in the window title and next to the “Estimated time left” element. This text is updated constantly as the system redraws the progress bar and serves as an alternate format for the information conveyed by it. The “Download to:” element is an acceptable alternate format for the animation depicting the transfer of information from the Internet to the hard drive folder.

5-9.2.2 Offer User Preferences for Animation

Because animated UI elements can interfere with activated accessibility features of the operating system or with assistive technologies, operating systems or software applications must provide an option to disable the animated elements (i.e., a preference setting). Ensure that alternate formats or alternate access methods are available when animated UI elements are disabled (see Technique above). For more information, refer to Section 5-3, Activated Accessibility Features.

Exhibit 5-9.2.2

Examples of Offering User Preferences for Disabling Animations

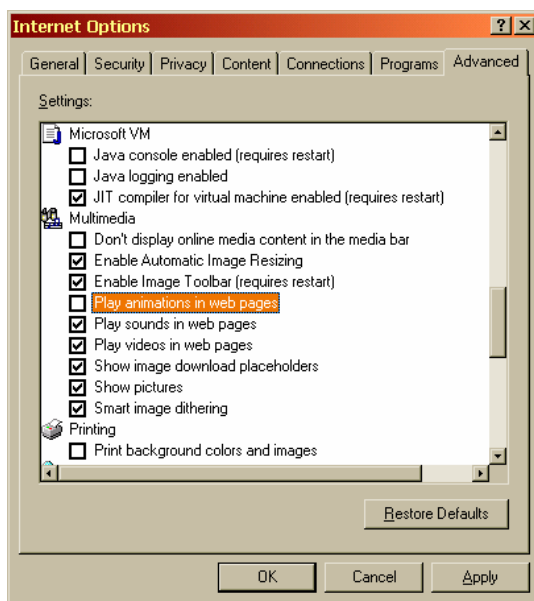


Figure A. The "Internet Options" Dialog Box in Microsoft Internet Explorer™.

Some examples of offering a user preference option for disabling animations.

Figure A shows the "Internet Options" for the Microsoft Internet Explorer™ Web browser application. This operating system-level control panel allows the user to set Internet-related options for security, privacy, connection, helper applications, and advanced options. Included in the "Advanced" options are some user preferences for multimedia, including a checkbox to indicate whether to allow animations to play in Web pages (indicated by the solid orange highlight).

Figure B (below, left) shows the Microsoft Office Assistant, an animated avatar that presents a simple dialog window to capture a user request for help. When a user types a question in the "What would you like to do?" input and presses "Search," the user is offered a list of help options.

After selecting an option, the system will open the main help system for the application with the selected guidance (**Figure C**, below, right). This animated Office Assistant can be disabled, and the user can still access an equivalent input dialog within the main help system that is accessible from the "Help" menu. This main help system can be read by assistive technology and does not require animation to offer equivalent functionality.

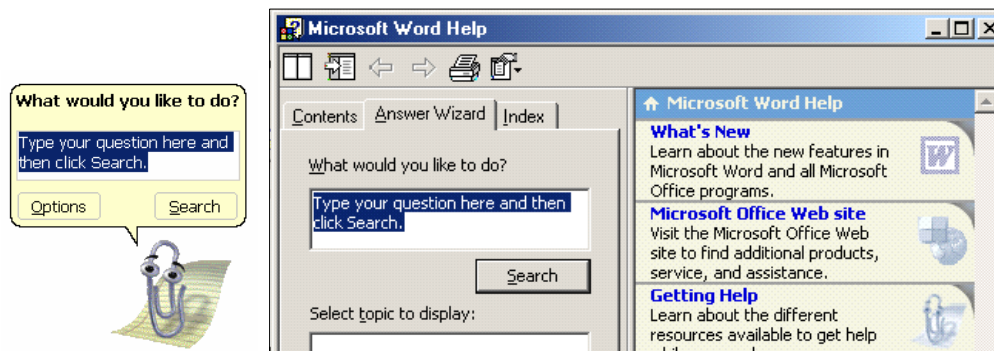


Figure B and Figure C. The Microsoft Windows Office Assistant offers access to application-level help.

5-9.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the operating system or software application without assistive technology to verify that animations can be disabled and that critical information is conveyed without animation.

- a. Navigate through the operating system or software application through usage scenarios that cover all core functionality for the system or application. Note where animated user interface elements are used to convey meaning.
- b. Ensure that, for all animated user interface elements used to convey meaning, the system or software offers a nonanimated alternate format that provides equivalent information (e.g., user-visible or programmatically accessible textual information).
- c. For animated user interface elements used as controls or as an “access method” (e.g., the Microsoft Windows Office Assistant), ensure that the system or application offers an alternate access method (i.e., a redundant way to access the help system for the Microsoft Windows Office Assistant, such as pressing the F1 key or the “Help” menu item).
- d. Check for a method to turn off or disable (as a preference) animated user interface elements individually in the system or application. Ensure that alternate formats or alternate access methods are available in place of the disabled animated user interface elements.

5-9.4 References

- Sun Java Application Design: Animation
<http://java.sun.com/products/jlf/ed2/book/HIG.Visual4.html>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-10 Color Coding

Operating systems and software applications must not use color as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element (Section 508, Provision §1194.21i).

5-10.1 Rationale

People who cannot differentiate between certain color combinations, are otherwise visually impaired, or who are blind may have difficulty using software applications or interpreting content that depends on the ability to identify color. In addition, when foreground and background colors are too close to the same hue, such people may not be able to distinguish between them.

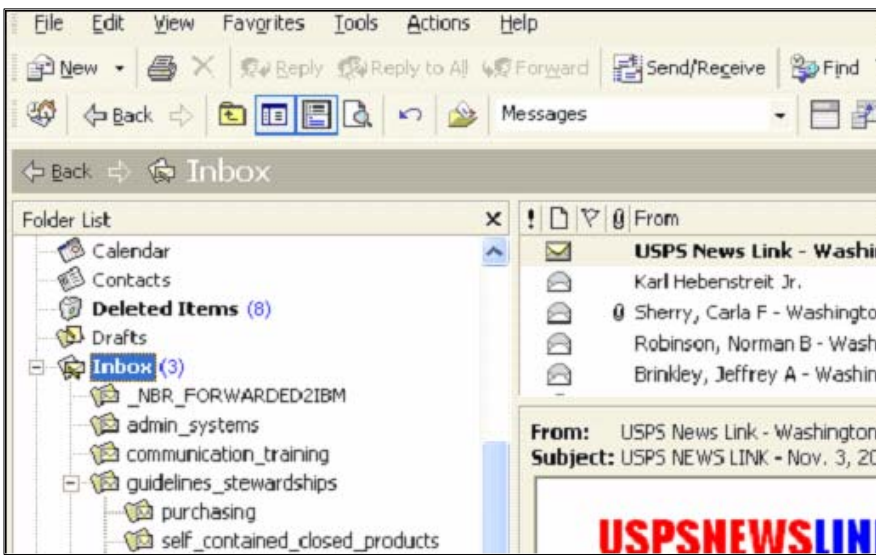
Operating systems and software applications should not use color as the only method for conveying information, indicating an action, prompting a response, or distinguishing a visual event. Using color to enhance the identification of important features of the interface is acceptable as long as other methods of identification are also used (e.g., alternative or descriptive text, or image-based enhancement).

5-10.2 Techniques

5-10.2.1 Always Combine Color With an Alternate Format

Operating systems or software applications must not use color alone to convey information, indicate an action, prompt a response, or distinguish an important visual event. For example, do not instruct a user to “select an item from those listed in green.” Instead, relay that information without referring to color. If color is used, provide an accessible alternate format or method, such as a textual label or text formatting, to convey the equivalent information (e.g., use color and boldface text to indicate highlighted information).

Exhibit 5-10.2.1

Example of Combining Color With Alternate Formatting


An example of combining color with another alternate format to convey important information.

This figure shows three distinct window display areas separated by panes in an e-mail client software application. The window areas include a “Folder List” area (shown on the left), a message listing area (shown on the upper right), and a message preview area (shown in the lower right).

In the “Folder List” area, a number in parentheses is shown in blue to indicate the number of unread messages in the folder. Color is not used here alone to convey this important information; the folder names that contain the unread messages (i.e., “Deleted Items,” “Inbox”) are also shown in boldfaced text.

5-10.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the operating system or software application without assistive technology to verify that critical information or calls to action are conveyed without dependence on color alone.

- a. Navigate through the operating system or software application through usage scenarios that cover all core functionality for the system or application.
- b. Identify user interface elements that use color to convey meaning, indicate an action, prompt a response (e.g., error messages), or distinguish an important visual event. Include elements that change color based on some event (e.g., a new e-mail message is red when unread and then changes to black when read).
- c. Ensure that, for all elements that use color to convey critical information or meaning, there is an alternate method used to convey the same information that does not rely on color (e.g., user-visible or programmatically accessible textual information). Alternate methods can include text labels or text formatting.

5-10.4 References

- W3C Accessibility Guidelines: Colors
<http://www.w3.org/TR/WCAG10-TECHS/#tech-color-convey>
- Sun Java: Developing Accessible JFC Applications
<http://www.sun.com/access/developers/developing-accessible-apps/>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-11 Video Frequency

Software must not use flashing or blinking text, objects, or other user interface elements having a flash or blink frequency between 2 and 55 cycles per second (2.0 Hz and 55.0 Hz). If provided, offer a way to change the frequency or disable flashing altogether (Section 508, Provision §1194.21k).

5-11.1 Rationale

User interface elements and screen items that flash or blink can cause seizures or other involuntary responses, particularly if they flash in high intensity, with high contrast, and in the frequency range between 2 and 55 cycles per second (2.0 Hz and 55.0 Hz). The 2.0 Hz limit was chosen by the Access Board to be consistent with proposed revisions to the ADA Accessibility Guidelines that, in turn, are being harmonized with the International Code Council (ICC)/ANSI A117 (ANSI A117.1-1998) standard, "Accessible and Usable Buildings and Facilities," which refers to a 2.0 Hz limit.

Operating systems and software applications must not use flash or blink rates in the range stated above. This includes, but is not limited to, flashing text, rapid screen writes, graphics that turn on and off, and repeatedly changing or animated user interface elements. If software uses flashing or blinking user interface elements, offer a feature that allows the user to change their frequency or disable them.

5-11.2 Techniques

5-11.2.1 Use Only Acceptable Flashing and Contrast Ranges

Software applications must avoid providing user interface elements that flash or blink in the frequency range between 2 and 55 cycles per second (2.0 Hz and 55.0 Hz) and that have a high level of contrast. Contrast means a difference in visual attributes (i.e., hue, lightness, saturation) of an object's foreground and background.

One possible development technique involves setting the flashing or blinking elements to the operating system cursor blink rate. The cursor blink rate can be set by the user, and can be set to a range between 0.2 and 1.2 seconds.

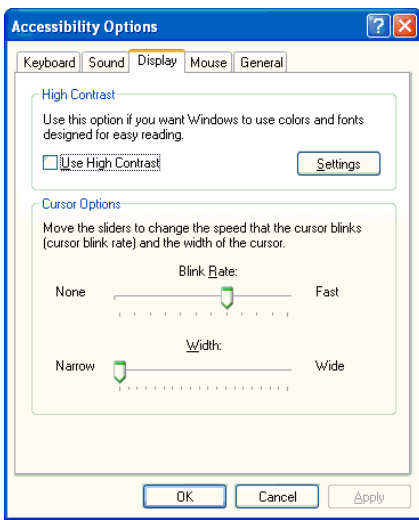
The software application can use the cursor blink rate to control the blink rate of other user interface elements.

When software applications do provide flashing elements, development techniques must be used to allow the user to control certain aspects of the flashing element's flash or blink rate (so as to alleviate the risk of producing adverse physical affects). These development techniques include the following:

- Providing the user with the ability to adjust the flash speed.
- Minimizing the area of the screen that is flashing (smaller areas are less likely to cause seizures).
- Avoiding flashing that has a high level of contrast between the states (some individuals are more susceptible to high-intensity flashing).
- Disabling the flashing altogether.

Exhibit 5-11.2.1

Example of Using Only Acceptable Flashing and Contrast Ranges



An example of using acceptable flashing and contrast ranges.

This figure shows the Microsoft Windows XP™ Operating System's "Display" Accessibility Options control panel, which includes an option to allow users to set the cursor blink rate. This can be accessed by clicking the "Start" menu, then "Control Panels," then "Accessibility Options: Display (tab)."

In the "Cursor Options" area of this control panel, users can click and move the "Blink Rate" slider to change the cursor blink rate. The rate can be set to 12 different options ranging from None (no flash or 0 milliseconds) to Fast (1.2 seconds).

Developers of Windows-based software applications can set the software application to query this setting by calling "GetCaretBlinkTime." Aligning any blinking software user interface elements with this setting will help ensure acceptable flash rates for individual users.

5-11.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the software without assistive technology to test for acceptable frequency and a disable function for all flashing or blinking elements.

- Navigate the software application through usage scenarios that cover all core functionality.

- b. Search for flashing or blinking text, objects or other user interface elements. Also, search for elements that employ a quick change from dark to light (similar to strobe lights).
- c. Use an electronic tester (i.e., screen calibrator) or a software test feature to determine the time interval between flashes for all blinking or flashing user interface elements.
- d. If any flashing or blinking objects cannot be tested, they will need to be omitted from the software application altogether.
- e. Adjust or fix any flashing or blinking elements that have an unacceptable Hertz range or that have a high level of contrast between states. Ensure that flashing areas of the screen are kept to as small an area as possible.
- f. For all blinking or flashing elements that are included, a method must also be offered that allows users to change the elements' flash rate or disable them altogether.

5-11.4 **References**

- Epilepsy Action: Photosensitive Epilepsy
<http://www.epilepsy.org.uk/info/photofrm.html>
- Microsoft Developers Network: "Flashing User Interface and the GetCaretBlinkTime Function"
http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnacc/html/ATG_AvoidFlashing.asp?frame=true
- International Code Council (ICC)/ANSI A117 standard, "Accessible and Usable Buildings and Facilities," ICC/ANSI A117.1-199
<http://www.iccsafe.org/a117/ansi98.html>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

5-12 Forms

When a form is included in a software application, it must allow people using assistive technology to access the information, controls (e.g., input fields, checkboxes, radio buttons, or push buttons), and functionality required to complete, review, revise, and submit it, including all directions and cues (Section 508, Provision §1194.211).

5-12.1 Rationale

People with mobility, dexterity, cognitive, or visual impairments, who rely on assistive technologies, often confront barriers when using electronic forms. The Postal Service and its many government and commercial business partners use electronic forms in software or Web applications to gather information or permit employees and customers to access services, benefits, or employment. People with disabilities who use assistive technologies must be able to access, complete, review, revise, and submit all parts of an electronic form to use it successfully (e.g., filling out an electronic shipping label).

When electronic forms are designed to be completed within a software application (including a Web-based application), the form must allow people using assistive technologies to access the information, controls (i.e., input fields, checkboxes, radio buttons, or push buttons), and functionality required to complete, review, revise, and submit it, including all directions and cues. The two primary characteristics of an effectively coded accessible form are that (1) the form provides programmatic and user-visible textual information about inputs and controls (i.e., they are labeled and named), and (2) the form can be completed using keyboard equivalents. Forms with these two primary characteristics will likely be usable by people who use assistive technology or who rely on the keyboard to use their system.

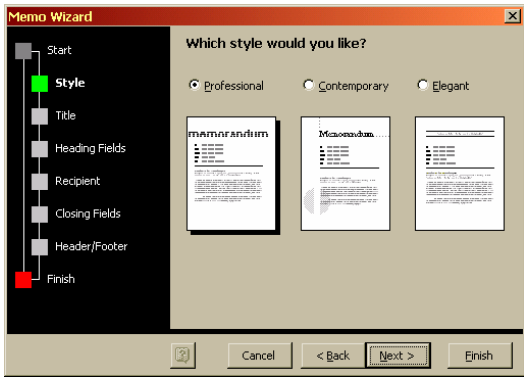
5-12.2 Techniques

5-12.2.1 Provide Textual Information About Controls

Use standard controls to provide both user-visible and underlying (programmatic) textual information about form controls. Standard controls eliminate the need for additional development or programming to expose the information about the control's identity, role, and state (via text) to the operating system and to assistive technology. Information about controls is both displayed to the user (i.e., meaningful labels, list input terms or items) and provided programmatically to assistive technology (i.e., control role, control state, etc.).

When no other option is available, nonstandard controls must use reliable accessibility frameworks (or component object models) that use service interfaces, event systems, APIs, and proxies to provide object information for the nonstandard controls to assistive technology. For more techniques and information, refer to Sections 5-5, User Interface and Programmatic Elements and 5-7, Textual Information.

Exhibit 5-12.2.1

Example of Providing Textual Information About Controls


An example of providing user-visible and programmatic textual information about controls located in a word processing software application.

This figure shows a standard wizard-style form that uses standard form elements or controls (i.e., radio buttons) that provide accessible textual information.

In this figure, the accessible, user-visible textual information includes a window title (“Memo Wizard”), a process indicator showing steps in the wizard process and current location (“style”), an input label (“Which style would you like?”), input option labels (“Professional”, “Contemporary,” and “Elegant”), and push-button labels (“Cancel”, “<Back,” “Next>,” and “Finish”).

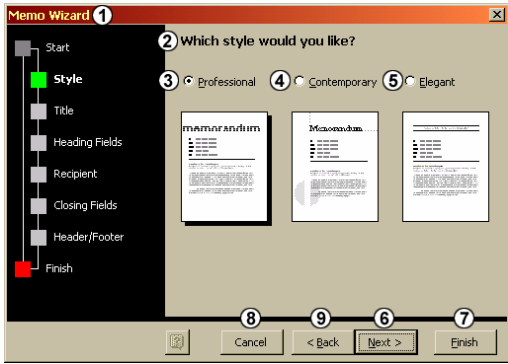
The controls also offer accessible programmatic textual information such as the identity, role, and state of the form elements. For example, in the figure, the radio button input option for “Professional” would communicate the textual information “radio button” and “selected” to a screen reader.

5-12.2.2 Provide Keyboard Access to Controls

Provide the ability to navigate logically to every control in a form and to operate all controls using the keyboard (i.e., keyboard equivalents). For example, the TAB key is a standard for navigating among groups of controls and the ARROW keys are a standard for navigating among controls within a group. Pressing ENTER and SPACEBAR are standards for operating controls (i.e., selecting a list element or submitting a form for processing).

Navigation should be in a logical tab order among controls in a form. The tab order is the order in which the TAB key moves the keyboard focus from one control or item to the next. Normally, the tab order is from left to right and then top to bottom.

Exhibit 5-12.2.2

Example of Providing Keyboard Access to Controls


An example of providing keyboard access to controls located in a word processing software application.

This figure shows a standard wizard-style form that uses standard form elements or controls (i.e., radio buttons) and provides users the ability to navigate and operate the controls in a logical order.

In this figure, the TAB key can be used to navigate logically among all controls, including the window title (“Memo Wizard”), an input label (“Which style would you like?”), input option labels (“Professional,” “Contemporary,” and “Elegant”), and push-button labels (“Next>,” “Finish,” “Cancel,” and “<Back,”). Note that the order for the push buttons is in the most logical order: “Next>” is the default option and is therefore first in the tab order, followed by the next logical button “Finish.”

Here, the input options (i.e., the radio buttons) can be selected using SPACEBAR, and the ENTER key can be used to operate (i.e., SUBMIT) a push-button control.

5-12.2.3 Expose On-Screen Input Focus

Ensure that all standard and nonstandard controls allow operating system accessibility features and assistive technology to access and track system focus. For nonstandard controls, expose focus information to the operating and assistive technology and provide standard cursor representations. Programmatically control the cursor representation with appropriate API calls (i.e., calls that set the cursor representation size or shape, change the position of the cursor representation, make the cursor representation visible, or specify a new cursor representation). For more techniques and information, see Section 5-4, On-Screen Focus.

**Exhibit 5-12.2.3
Example of Exposing On-Screen Input Focus**

Figure A. A wizard-style form with focus on a radio button input.

Figure B. The same wizard-style form with focus on a push button.

An example of exposing focus information for input controls located in a word processing software application. These figures show a standard wizard-style form that uses standard form elements or controls (i.e., radio buttons, and push buttons) and exposes the focus information for these standard controls. The on-screen focus can be moved with the TAB key in a logical order as described in exhibit 5-12.2.4. In Figure A, the focus is on the first input option, a radio button labeled “Professional.” In Figure B, the focus has been moved with the TAB key to the default push button, labeled “Next>.”

5-12.2.4 Associating Labels with Controls

Provide explicit labels for all form controls and associate those labels and other field descriptors with their related controls. Position labels in a logical location relative to their associated data entry (input) fields (i.e., immediately to the left or above the associated input field). Note that some assistive technology (e.g., screen readers) use proximity to identify labels if they are not exposed programmatically.

**Exhibit 5-12.2.4
Example of Associating Labels With Controls**

An example of associating labels with form inputs used to change a user password in a Postal Service supply management application.

In this figure, there are three text inputs and two push buttons. The explicit or user-visible labels for the text inputs are positioned properly, immediately to the left of their associated input fields. These labels can be read properly by a screen reader or other assistive technology.

5-12.2.5 **User Response Time and Timeouts**

Provide an option to adjust the response times on time-sensitive forms, instructions, and timed software features. Software applications often use timed features and timeouts for various security and business reasons. However, some users have relatively slow reaction times or difficulty using such timed features.

When a timed response is required, the user must be alerted and given both a mechanism and sufficient time to indicate that they need additional time to complete the form.

For example, if the business or security requirement is that an application should timeout after 15 minutes of inactivity, then a couple of minutes before the timeout, an alert must communicate the impending timeout to the user and ask if more time is needed. If the user does not respond or indicates that no more time is needed, the timeout can take place. If the user elects to have more time in the timed application, then there should be no timeout until the next cycle of inactive time prompts another timeout alert.

If the business and/or security requirement is that a timed feature in a software application is only for a fixed session or time limit (combined activity or inactivity), then the situation is a bit more complex. In this situation, the user must be notified at the start of the session that the session will expire after a fixed amount of time. A couple of minutes before the fixed time limit, an alert must communicate the impending timeout to the user. Then, the user can be timed out at the appointed time.

Exhibit 5-12.2.5

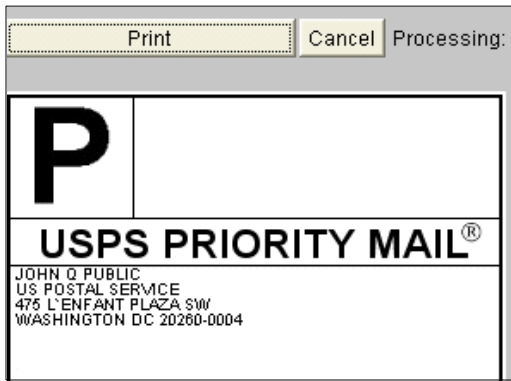
Example of a Timeout Feature

Figure A. The Java-based custom shipping label printer in the Click-N-Ship™ application.

An example of a timeout feature in the Postal customer shipping label application Click-N-Ship™. This application captures return and delivery addresses, package details, and services information from the user before presenting a custom shipping label with or without postage. The label is presented using the Java-based application shown in **Figure A**. After presenting the label, the user can print and attach it to their mail package.

Due to security requirements, there is a fixed 15-minute timeout during the label presentation event. **Figure B** shows the alert message that is presented to a user 2 minutes before a timeout is about to occur in the application. Clear instructions for how to extend the session are provided, so that the user can ask for more time to complete his or her task.

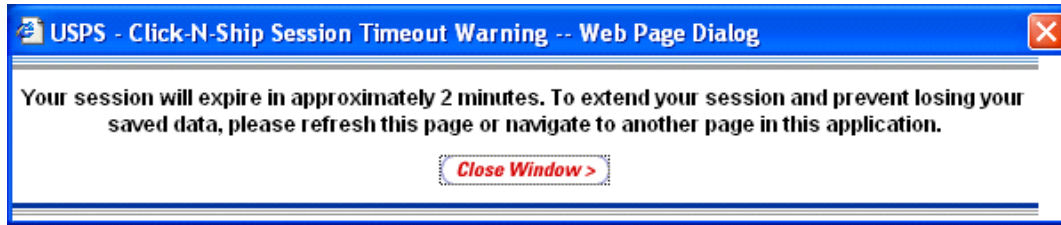


Figure B. The alert that warns users of an impending timeout in the Click-N-Ship™ application.

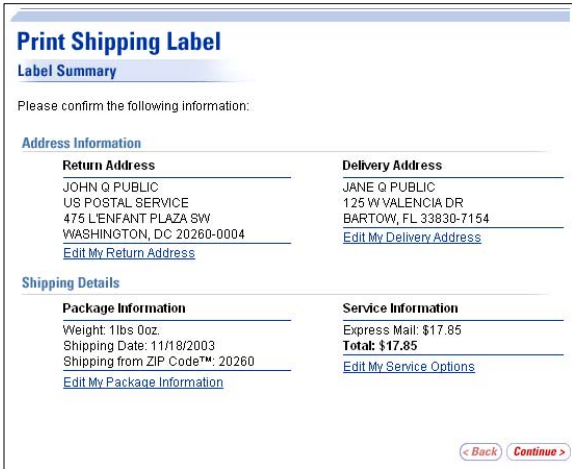
5-12.2.6 Support User Scanning of Forms and Confirmation of Input

Provide an option for users to review or confirm the input they have provided via an electronic form and provide a mechanism for revising input where appropriate.

Allow users to scan the contents of a form before providing input, by offering form- (or screen-) level validation instead of control-level validation of user input. Where control-level input is required, use valid, preselected default values to prevent users from being able to scan through form controls sequentially without being required to provide input. If it is not possible in such cases to preselect such control-level input, use form- (or screen-) level validation instead (i.e., validate user input when the user attempts to submit the form. For more techniques and information, see Section 5-2, Keyboard Access.

Exhibit 5-12.2.6

Example of User Confirmation of Input



Print Shipping Label
Label Summary

Please confirm the following information:

Address Information

| | |
|--|---|
| Return Address | Delivery Address |
| JOHN Q PUBLIC US POSTAL SERVICE 475 L'ENFANT PLAZA SW WASHINGTON, DC 20260-0004 Edit My Return Address | JANE Q PUBLIC 125 W VALENCIA DR BARTOW, FL 33830-7154 Edit My Delivery Address |

Shipping Details

| | |
|--|---|
| Package Information | Service Information |
| Weight: 1lbs 0oz Shipping Date: 11/18/2003 Shipping from ZIP Code™: 20260 Edit My Package Information | Express Mail: \$17.85 Total: \$17.85 Edit My Service Options |

[< Back](#) [Continue >](#)

An example of offering users a way to confirm the input they have provided on an electronic form used by the Postal Service's Click-N-Ship™ application.

This application contains a series of input screens that collect information from the user, such as return and delivery addresses, package information, and service information. After collecting such input, the application offers a "Label Summary" screen, where users can confirm their input, choose to edit any of it, and continue with the label print purchase and print processes.

5-12.2.7 Dynamic Forms

The Postal Service uses certain software applications that allow users to access, edit/save, complete, print, and electronically distribute dynamic forms. These software applications must comply with the requirements stated in this chapter, if applicable.

Because the same software that is used to complete the dynamic form can be used to edit the form, users can unintentionally switch to an editable state, if not informed properly. Such software applications must clearly indicate what mode the user is in (i.e., edit or read only). This requirement to clarify the identity, role, operation and state of user interface and programmatic elements is covered in Section 5-5, User Interface and Programmatic Elements.

In addition, dynamic forms themselves can serve as "applications" (i.e., they can contain user interface and programmatic elements that help a user perform specific tasks). Often these elements are nonstandard controls that must comply with all applicable requirements in this chapter. Dynamic forms should also be locked to prevent unintentional modification by end users.

5-12.3 Testing

Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

Conduct a manual inspection of the electronic form with assistive technology to verify that text information is accessible and exposed programmatically.

- a. Navigate all screens that comprise the electronic form using a screen reader (e.g., JAWS), including access point(s), completion screens, review screens, and revision/submission screens, and including all directions and cues.
- b. As you do, verify that the screen reader reads and provides meaningful information about all form user interface elements, inputs, and controls (i.e., headings, text instructions, radio buttons, checkboxes, list boxes, drop-down menus, push buttons, etc.).
- c. Document which form user interface elements, inputs, and controls are not accessible via the screen reader, including names, content, attributes, and cursor location.
- d. For the form user interface elements, inputs, and controls in question, fix then retest using this procedure.

Conduct a manual inspection of the electronic form to verify keyboard access. Unplug or disable all input devices except the keyboard, then attempt to access, complete, review, revise, and submit the electronic form, using only the keyboard. Standard keyboard equivalents should be used where possible, but if nonstandard keyboard equivalents are used, they must be communicated to the user via the application's user assistance. Whether using standard or nonstandard keyboard equivalents, the following keyboard operations should be tested:

- a. If menus are included in the electronic form, navigate to, display, and select each menu and menu item with keyboard equivalents. This includes the menu bar and context-sensitive menus.
- b. If toolbars are included in the electronic form, access and select all functions provided on toolbars via redundant menu items or using keyboard equivalents.
- c. Move the focus between any windows, sections/panes, and modeless dialogs using standard keyboard equivalents.
- d. Navigate logically to every control in the electronic form windows and dialogs and operate all controls using standard keyboard equivalents.

Conduct a manual inspection of the electronic form with and without assistive technology to verify that the on-screen focus is well defined.

- a. Using only the keyboard and keyboard equivalents, navigate through the electronic form user interface (i.e., windows, menus, toolbars, and controls) to ensure that the focused object is tracked and that an

appropriate operating system standard cursor or highlight element is displayed for the various focused objects.

- b. Use a screen reader to navigate through the electronic form user interface (i.e., windows, menus, toolbars, controls) to ensure that the focused object is tracked and that appropriate object information is read by the screen reader for the various focused objects. When the focus is on the object or control, the assistive technology should be able to access and state the object label (name), its type (role), its state, cursor position, and its content or current value.
- c. Use a screen magnifier to navigate through the electronic form user interface (i.e., windows, menus, toolbars, or controls) to ensure that the focused object is tracked and that an appropriate operating system standard cursor is displayed for the various focused objects.
- d. Note any object for which focus is not tracked, for which object name, role, state, cursor position and value is not accessible to assistive technology, or which display an inappropriate standard cursor.
- e. For the objects in question, fix then retest using this procedure.

Conduct a manual inspection of the electronic form without assistive technology to verify that accommodations are made for time-based responses, input review, and confirmation.

- a. Navigate through the electronic form user interface (i.e., windows, menus, toolbars, and controls) to ensure that, where a timed response is required, the user is alerted and given a mechanism to indicate that more time is needed.
- b. Navigate through the electronic form user interface (i.e., windows, menus, toolbars, and controls) to ensure that users are given an option to review and confirm the input they have provided, before submitting the form.

5-12.4 References

- National Cancer Institute: 508 Tutorial (n): Forms
http://usability.gov/web_508/tut-n.html
- Web Accessibility In Mind (AIM): “Creating Accessible Forms”
<http://www.webaim.org/howto/forms/>
- Sun Java Using Swing Components: Examples (1.4)
<http://java.sun.com/docs/books/tutorial/uiswing/components/example-1dot4/index.html#ButtonDemo>

Note: Postal Service developers and purchasing agents are strongly urged to obtain updated references for application or operating system accessibility references when designing or purchasing Postal Service applications.

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Appendix 5-A

Software Applications and Operating Systems Accessibility Checklist

Use this as a tool for high-level guidance in determining if a software application or operating system is compliant or accessible.

| Requirement Number and Summary | Yes, No, or N/A | Comments |
|--------------------------------|--|----------|
| 1 | <p>Keyboard Access. When software applications are designed to run on a system that has a keyboard, software application functions must be executable from a keyboard where the function itself or the result of performing the function can be identified or labeled with text (Section 508, §1194.21a).</p> | |
| 2 | <p>Activated Accessibility Features. Software applications must not disrupt or disable activated features of other products that are identified as accessibility features, where those features are developed and documented according to industry standards. Software applications also must not disrupt or disable activated accessibility features of any operating system where the application programming interface (API) for those accessibility features has been documented by the manufacturer of the operating system and is available to the product developer (Section 508 §1194.21b).</p> | |
| 3 | <p>On-Screen Focus. Operating systems and software applications must provide a well-defined on-screen indication of the current focus that moves among user interface elements as the input focus changes. The focus must be programmatically exposed so that assistive technology can track focus and focus changes (Section 508, §1194.21c).</p> | |

| Requirement Number and Summary | Yes, No, or N/A | Comments |
|--|-----------------|----------|
| <p>4 User Interface and Programmatic Elements. Sufficient information about a user interface element including the identity, operation, and state of the element must be available to assistive technology. When an image represents a program element or control, the information conveyed by the image must also be available in text as described in Section 5-7, Textual Information (Section 508, §1194.21d).</p> | | |
| <p>5 Consistent Use of Images. When images are used to identify or represent controls, status indicators, or other user interface or programmatic elements, the meaning assigned to those images must be consistent throughout a software application (Section 508, §1194.21e).</p> | | |
| <p>6 Textual Information. Software applications must provide textual information using operating system functions for displaying text. The minimum information that must be made available is text content, text cursor location, and text attributes (Section 508, §1194.21f).</p> | | |
| <p>7 User-Selected Display Attributes, Color, and Contrast. Software applications must not override user selected contrast and color selections and other individual display settings (i.e., color schemes and background patterns that provide sufficient contrast, fonts, and sizes for the display of user interface elements). When a software application permits a user to adjust color and contrast settings, a variety of color selections capable of producing a range of contrast levels must be provided (Section 508, §1194.21g and §1194.21j).</p> | | |
| <p>8 Animation. When animation is displayed, the information must be displayable in at least one non-animated presentation mode at the option of the user (Section 508, §1194.21h).</p> | | |
| <p>9 Color Coding. Operating systems and software applications must not use color as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element (Section 508, §1194.21i).</p> | | |

| Requirement Number and Summary | Yes, No, or N/A | Comments |
|--------------------------------|--|----------|
| 10 | Video Frequency. Software must not use flashing or blinking text, objects, or other user interface elements having a flash or blink frequency greater than 2 Hertz (Hz) and lower than 55 Hz. If provided, offer a way to change the frequency or disable flashing altogether (Section 508, §1194.21k). | |
| 11 | Forms. When a form is included in software application, the form must allow people using assistive technology to access the information, controls (i.e., input fields, checkboxes, radio buttons, or push buttons), and functionality required for completion, review, revision and submission of the form, including all directions and cues (Section 508, §1194.21l). | |

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Summary of Software Applications and Operating Systems Testing Methods

Following is a summary of the testing methods described in this chapter, presented for reference only. Manual inspection-based testing using the methods described in this chapter must accompany any automated tests. Some of these manual tests may be automated using testing tools or Integrated Development Environment (IDE) features, as long as testing occurs in the context of usage by assistive technology users.

| Testing Method | Associated Specific Requirements |
|---|---|
| Manual inspection without assistive technology but with keyboard only. | Keyboard Access Forms |
| Manual inspection with and without assistive technology with focus on testing user-selected (activated) accessibility features. (Includes both OS accessibility features, display attributes, and other settings.) | Activated Accessibility Features User-Selected Display Attributes, Color, and Contrast |
| Manual inspection with and without assistive technology to verify on-screen focus. | On-Screen Focus Forms |
| Manual inspection to verify accessibility of user-visible and programmatic textual information. Includes labels for images. Includes testing for all user interface and programmatic elements. | User Interface and Programmatic Objects Consistent Use of Images Textual Information Forms |
| Manual inspection without assistive technology to verify that problematic elements can be disabled, that alternate formats or access methods are provided. (Includes testing for a “dependence” on a modality.) | Animation Color Coding Video Frequency |
| Manual inspection for general design considerations. | Forms |

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6 Web-Based Information and Applications Accessibility Guidelines

6-1 Overview

6-1.1 Contents

This chapter contains the electronic and information technology (EIT) performance requirements related to the following:

EIT Technical Standard 1194.22, Web-Based Intranet and Internet Information and Applications, Provisions (a) thru (p).

6-1.2 Summary

6-1.2.1 Technology

The requirements in this chapter cover the following:

- All information technology solutions, regardless of size or whether purchased or developed.
- Web-based applications and all associated data, information, training material, and documents.

Note: For EIT, requirements in more than one chapter of this handbook may apply. For instance, applications designed for both stand-alone and Web browser environments may require compliance with the standards on software application and operating system accessibility (chapter 5). Applications that include calls to video or multimedia or that are part of software that runs in self-contained platforms or in kiosks may require consideration with other chapters. And for applications designed to create output beyond direct interaction with the application itself (e.g., reports, data files, or media objects), developers must verify that these outputs are also accessible to users of assistive technology.

6-1.2.2 **Audience**

This chapter applies to anyone who buys or develops Web-based information and applications for the Postal Service (i.e., Postal Service employees, vendors, contractors, and business partners). Web-based information and applications include information technology solutions of all scope and magnitude, consisting of simple or complex purchases or development of Web-based applications and all associated data, information, training material, and documents.

6-1.3 **Structure and Use**

Each subchapter is dedicated to a provision that supports the EIT Technical Standard.

Each provision has sections on rationale, techniques, testing, and references, as shown below in section 6-2.

6-1, Overview

6-2, Non-text Elements

- Requirement
- Rationale
- Techniques (and examples)
- Testing
- References

6-3, Multimedia

6-4, Color

6-5, Style Sheets

6-6, Image Maps

6-7, Tables

6-8, Frames

6-9, Screen Flicker

6-10, Equivalent Text Content

6-11, Scripting Languages

6-12, Plug-ins and Applets

6-13, Forms

6-14, Portable Document Format (PDF)

6-15, Repetitive Navigation

6-16, Timed Responses

Appendix 6-A, Checklist

6-1.4 General Requirements

Accessibility is accomplished by designing software that accommodates the widest range of users, including those with disabilities. Listed below are some general requirements that will help the Postal Service ensure that Web-based applications and information remain accessible:

- The Postal Service will take advantage of operating system and **Web client built-in accessibility features** when those features are available to both end users and software developers.
- The Postal Service will maintain standards for the following **accessibility aids or assistive technologies** that are used by people with disabilities to access Web-based applications and information:
 - *Screen magnifiers*: Help visually impaired people by allowing them to enlarge any part of the screen (i.e., as with a magnifying glass).
 - *Screen readers*: Help blind people by making on-screen information available as synthesized speech or for display as refreshable Braille.
 - *Voice input aids*: Help mobility- or dexterity-impaired people by allowing them to control the computer with their voice instead of with a mouse or keyboard.
 - *On-screen keyboards*: Help people who are unable to use a standard keyboard by providing an on-screen keyboard that can be used with a pointing device.
 - *Keyboard filters*: Help people who have trouble typing by compensating for erratic motion, tremors, or slow response time.
 - *Alternative input devices*: Help people who would prefer to control their computer with a device other than a keyboard or mouse.
- The Postal Service will develop **Web-based applications** that are based on interoperable specifications and do not interfere with accessibility features installed and activated by a user (e.g., operating system features and Web client capabilities as well as installed accessibility aids). Web-based developers should do the following:
 - Support native operating system and activated accessibility features for major operating systems that are integrated with input and output devices (e.g., keyboard, sound, display, or mouse). These features are supported by most Web clients and Web browsers. Developers should be aware of how these features will be used in combination with Web-based technologies. Standards for each operating system related to each specific requirement are shown in the “References” area under each specific requirement in Chapter 5, Software Applications and Operating Systems.
 - Use standard markup tags in creating Web content where possible (i.e., use the W3C recommendations). Standardized markup is often already supported by Web clients and operating

system accessibility features. Using these tags will often eliminate the need for software to provide explicit accessibility support, unless the behavior of the Web content has been enhanced.

- Use caution when using plug-ins or enhancing Web content, because accessibility aids may have difficulty identifying them (i.e., accessibility aids require specific information to work successfully with screen elements). When custom or enhanced Web content is used, developers must use appropriate methods to allow Web content and information (e.g., providing alternate or equivalent content.) to function with accessibility aids. The nonproprietary information that is created using standard HTML, XHTML, XML, or SGML allows for access using multiple clients (tools), reduces development costs, and permits the interoperability of technologies unknown by the author or creator of the information. Provide flexibility by allowing for a variety of input (e.g., keyboard, mouse) and output (e.g., color, sound, images, text) methods.
- Allow accessibility aids and nonstandard clients to use and configure the Web applications and information automatically. For example, detecting a specific browser and providing additional modification of Web content should not prevent unknown clients and accessibility aids from accessing the content.

Handbook AS-885, *usps.com Development Process and Standards*, provides processes and standards for building and maintaining an information presence or application on *usps.com* and defines the design and development standards and best practices for use on that site. This handbook may be accessed online at <http://blue.usps.gov/cpim/ftp/hand/as885.pdf>.

Postal Service employees are required to register all Web-based applications in the Enterprise Information Repository (EIR) at <http://eir>. This information will be used to report compliance and includes any related Section 508 noncompliance issues.

6-1.5 Testing for Compliance

When testing Web-based applications and information for compliance, it is important to be aware that a Web-based application can only include only functionality supported by the Web client on which it executes. For example, a Web-based application running on the current generation of Web browsers can provide graphical functionality and support the most common Internet technologies. However, if those same users operate their computers a text browser, they are restricted to a primarily character-based environment with little graphical capabilities. It is crucial to be aware of the client browser environment the user is accessing when considering review and accessibility compliance with Section 508. In addition, it is important to be cognizant of the functionality available to users with disabilities via the accessibility aids available on the operating system in use.

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools or integrated development environment (IDE) features can help automate these methods, but automated testing must be accompanied by manual testing. For example, a developer can use web tools to test for valid *syntax* (e.g., titling of all Web pages, hyperlink validation, inclusion of alternative text, or closing of tags), but a manual inspection must still be done to validate *semantics* and proper *rendering*. In other words, the *meaningfulness* of the Web page titles or alternative text must also be considered for the end user who uses assistive technology.

6-2 Non-Text Elements

A descriptive text equivalent must be provided for all non-text elements that render information required for comprehension of the content, as well as those that facilitate navigation. Non-text items include images, video, graphs, charts, animation, and audio (Section 508, Provision §1194.22a).

6-2.1 Rationale

Screen readers cannot interpret images without associated text.

6-2.2 Techniques

6-2.2.1 Provide Alternate Descriptive Text for Non-Text Elements

Use the *alt* attribute to provide a descriptive text equivalent that summarizes the content of each non-text element. Review all content generated by tools (i.e., exporting documents that contain images into HTML format) and validate any HTML that is created. Tool-generated content must have all the standard HTML required (such as proper header (TD and TH element attributes), *alt* attributes, and valid HTML) to meet the provisions in this handbook. Provide a text equivalent for animations using the *alt* attribute. If a longer description is necessary, use the *longdesc* attribute or a “D-Link” alternative.

Exhibit 6-2.2.1 (p. 1)

Example of Alternate Text for an Organization Chart

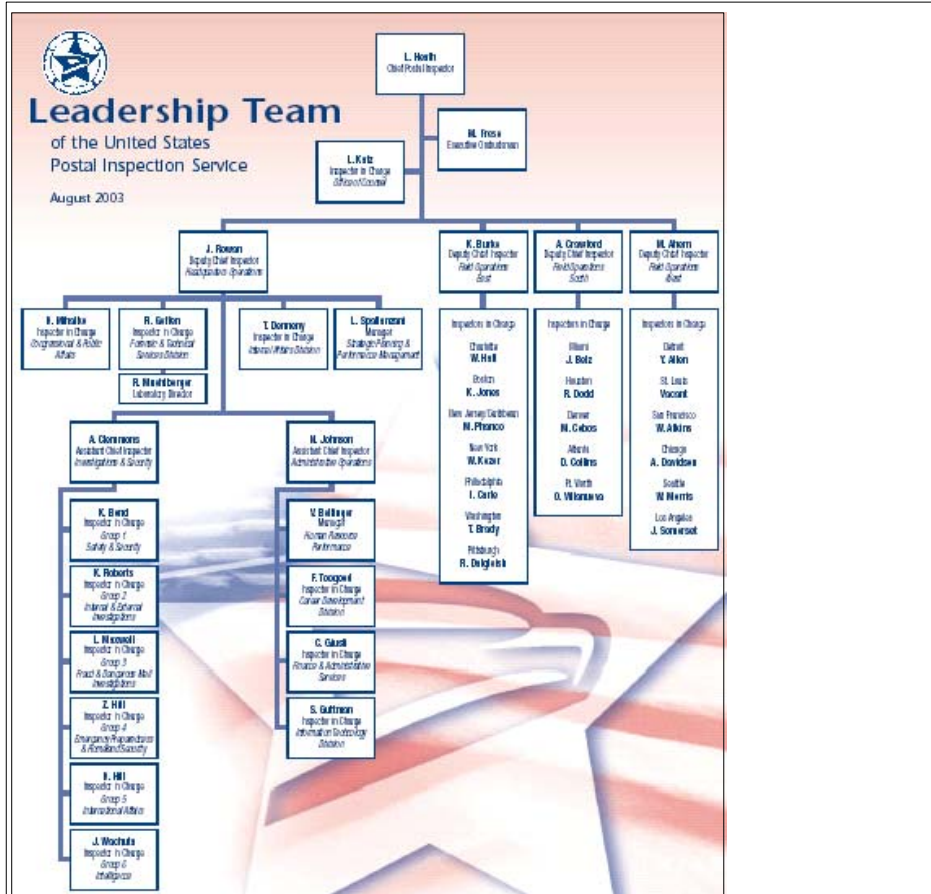


Figure A., Chart of the Leadership Team of the United States Postal Inspection Service

Figure B. The text alternative for the chart in Figure A

1. Chief Postal Inspector L. Heath
2. Executive Ombudsman, M. Freso
3. Inspector in Charge, Office of Counsel, L. Katz
4. Deputy Chief Inspector, Headquarters Operations, J. Rowan
4. Deputy Chief Inspector, Field Operations-East, K. Burke
- 4.1. Inspector in Charge, Charlotte, W. Hall
- 4.1. Inspector in Charge, Boston, K. Jones
- 4.1. Inspector in Charge, New Jersey/Caribbean, M. Phanco
- 4.1. Inspector in Charge, New York, W. Kezer
- 4.1. Inspector in Charge, Philadelphia, I. Carle
- 4.1. Inspector in Charge, Washington, T. Brady
- 4.1. Inspector in Charge, Pittsburgh, R. Dagleish

Exhibit 6-2.2.1 (p. 2)

Example of Alternate Text for an Organization Chart

- 4. Deputy Chief Inspector, Field Operations-South, A. Crawford
 - 4.1. Inspector in Charge, Miami, J. Belz
 - 4.1. Inspector in Charge, Houston, R. Dodd
 - 4.1. Inspector in Charge, Denver, M. Cobos
 - 4.1. Inspector in Charge, Atlanta, D. Collins
 - 4.1. Inspector in Charge, Ft. Worth, O. Villanueva

- 4. Deputy Chief Inspector, Field Operations-West, M. Ahern
 - 4.1. Inspector in Charge, Detroit, Y. Allen
 - 4.1. Inspector in Charge, St. Louis, Vacant
 - 4.1. Inspector in Charge, San Francisco, W. Atkins
 - 4.1. Inspector in Charge, Chicago, A. Davidson
 - 4.1. Inspector in Charge, Seattle, W. Morris
 - 4.1. Inspector in Charge, Los Angeles, J. Somerset

- 5. Inspector in Charge, Congressional and Public Affairs, D. Mihalko

- 5. Inspector in Charge, Forensic and Technical Services, R. Geffen
 - 5.1. Laboratory Director, R. Muehlberger

- 5. Assistant Chief Inspector, Investigations and Security, A. Clemmons
 - 5.1. Inspector in Charge, Group 1 - Safety and Security, K. Bond
 - 5.1. Inspector in Charge, Group 2 - Internal and External Investigations, K. Roberts
 - 5.1. Inspector in Charge, Group 3 - Fraud and Dangerous Mail Investigations, L. Maxwell
 - 5.1. Inspector in Charge, Group 4 - Emergency Preparedness and Homeland Security, Z. Hill
 - 5.1. Inspector in Charge, Group 5 - International Affairs, D. Hill
 - 5.1. Inspector in Charge, Group 6 - Intelligence, J. Wachuta

- 5. Assistant Chief Inspector, Administrative Operations, N. Johnson
 - 5.1. Manager, Human Resource Performance, V. Bellinger
 - 5.1. Inspector in Charge, Career Development Division, F. Toogood
 - 5.1. Inspector in Charge, Finance and Administrative Services, C. Giusti
 - 5.1. Inspector in Charge, Information Technology Division, S. Guttman

- 5. Inspector in Charge, Internal Affairs Division, T. Denny

- 5. Manager, Strategic Planning and Performance Management, L. Spallanzani

6-2.2.2 Provide Alternate Text for Images

Provide alternate descriptive text for images using the *alt* attribute of the `` tag. The description should be usable in place of the image. It should contain equivalent information, so that if you did not have access to the image itself, the alternative text would convey the necessary meaning.

For images that are not used for comprehension or navigation or for images that are redundant, use a blank alt attribute to cause assistive technology to ignore the image. Examples of this include a block of color or a transparent graphic that is used as a filler or spacer, a design element, or an image used as a background.

Exhibit 6-2.2.2

Using the Alternate Image Attribute

The following graphic is a screen shot of an image that has an *alt* attribute associated with it. The code for this image immediately follows the screen shot.



Figure A. United States Postal Service logo with eagle.

Figure B. HTML code for image in Figure A.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
  <meta content="text/html; charset=ISO-8859-1"
  http-equiv="content-type">
  <title>6b Alt Attribute Example</title>
</head>
<body>
  
</body>
</html>
```

6-2.2.3 Provide Long Descriptions in Addition to Alternate Text

Use the *longdesc* attribute when alternate descriptive text is not sufficient to adequately convey the information from a non-text element. The *longdesc* attribute provides a longer, more detailed description. This requires the creation of an additional HTML file that stores the more detailed information about the non-text element. The *longdesc* attribute is placed within an image `` tag to link the description or data to the image.

The following graphic is a screen shot of an image that has a *longdesc* attribute associated with it. The code for this image immediately follows the screen shot.

Exhibit 6-2.2.3 (p. 1)

Using Long Descriptions

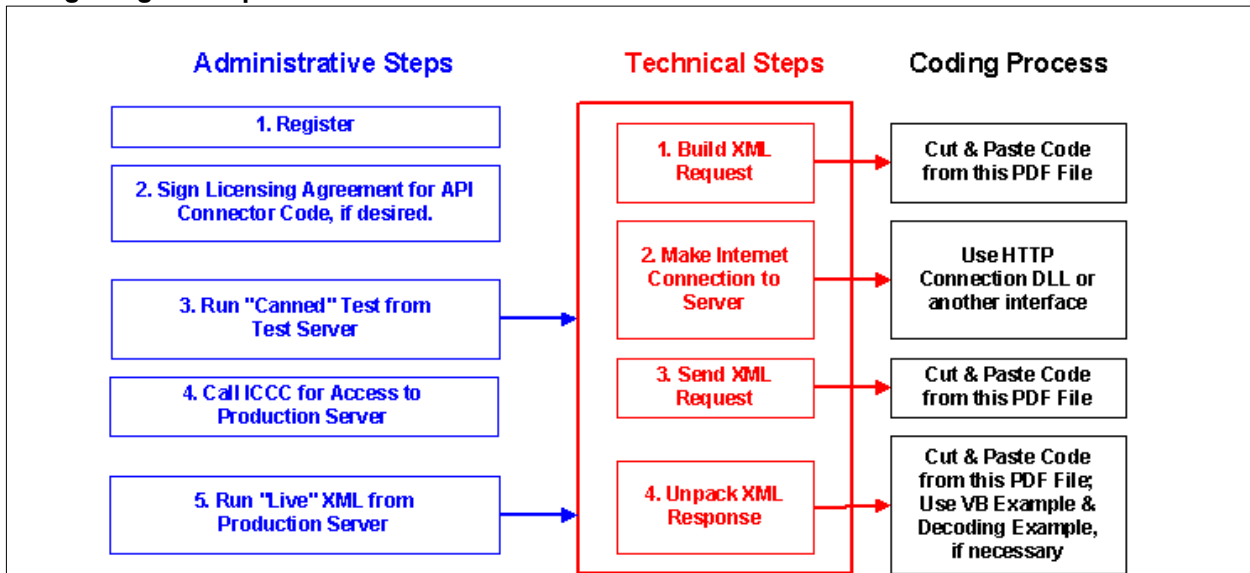


Figure A. Screen shot of a chart that describes the administrative and technical steps, and the coding process for canned and live requests

Figure B. HTML code for the image in Figure A

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>HTML using the &lt;IMG&gt; tag longdesc attribute</title>
</head>
<body>

</body>
</html>
```

Figure A is an example of a chart containing complex information that requires the use of the *longdesc* attribute. In this exhibit, the *longdesc* attribute refers to the following Web content:

Exhibit 6-2.2.3 (p. 2)

Using Long Descriptions**Figure C.** Long description of chart in Figure A

This process describes the [administrative steps](#), [technical steps](#), and [coding process](#) for canned and live requests.

Administrative Steps:

1. Register
2. Sign License Agreement of API Connector Code, if desired.
3. Run "Canned" Test from Test Server. [Follow Technical Steps](#).
4. Call ICCO for Access to Production Server
5. Run "Live" XML from Production Server. [Follow Technical Steps](#).

Technical Steps:

1. Build XML Request. [Review Coding Process step 1](#).
2. Make Internet Connection to Server. [Review Coding Process step 2](#).
3. Send XML Request. [Review Coding Process step 3](#).
4. Unpack XML Response. [Review Coding Process step 4](#).

Coding Process:

1. Cut & Paste Code from the PDF File
2. Use HTTP Connection DLL or another interface
3. Cut & Paste Code from this PDF File
4. Cut & Paste Code from this PDF File; Use VB Example & Decoding Example, if necessary

Figure D. HTML code for Figure C.

Content of "FlowchartExample_LD.html" is below:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
  <meta http-equiv="content-type"
    content="text/html; charset=ISO-8859-1">
  <title>Long Description of Process Steps</title>
</head>
<body>
<h1 style="font-weight: normal;"><span style="font-size: 10pt;">This
process describes the <a href="#Administrative_Steps">administrative
steps</a>,
<a href="#Technical_Steps">technical steps</a>, and <a
href="#Coding_Process">coding process</a> for canned and live
requests.</span></h1>
<h1><span style="font-size: 10pt; font-family: &quot;Times New
Roman&quot;;"></span></h1>
<h2><span style="font-size: 10pt; font-family: &quot;Times New
Roman&quot;;"></span><a
name="Administrative_Steps"></a>Administrative Steps:</h2>
<ol>
```

Exhibit 6-2.2.3 (p. 3)

Using Long Descriptions

```

<li>Register</li>
<li>Sign License Agreement of API Connector Code, if desired.</li>
<li>Run "Canned" Test from Test Server. <a href="#Technical_Steps">Follow
Technical Steps</a>.<br>
</li>
<li>Call ICCC for Access to Production Server</li>
<li>Run "Live" XML from Production Server. <a
href="#Technical_Steps">Follow
Technical Steps</a>.<br>
</li>
</ol>
<h2><a name="Technical_Steps"></a>Technical Steps:</h2>
<ol>
<li>Build XML Request. <a href="#Coding_Process_step_1">Review
Coding Process step 1</a>.<br>
</li>
<li>Make Internet Connection to Server. <a
href="#Coding_Process_step_2">Review Coding Process step 2</a>.</li>
<li>Send XML Request. <a href="#Coding_Process_step_3">Review Coding
Process step 3</a>.</li>
<li>Unpack XML Response. <a href="#Coding_Process_step_4">Review
Coding Process step 4</a>.</li>
</ol>
<h2><a name="Coding_Process"></a>Coding Process:</h2>
<ol>
<li><a name="Coding_Process_step_1"></a>Cut & Paste Code from the
PDF File</li>
<li><a name="Coding_Process_step_2"></a>Use HTTP Connection DLL or
another interface</li>
<li><a name="Coding_Process_step_3"></a>Cut & Paste Code from
this PDF File</li>
<li><a name="Coding_Process_step_4"></a>Cut & Paste Code from
this PDF File; Use VB Example & Decoding Example, if necessary</li>
</ol>
</body>
</html>

```

6-2.2.4 Use Descriptive Links

Although using the *longdesc* is the recommended approach, another way to provide a more detailed description of an image is the description link ("D-Link" or "D"). A "D-link" is a link, placed after the image itself, to a page that describes the image. In the anchor tag used to link to the description, use the *title* attribute to identify the link destination. For example: ``.

Descriptive links also involves providing usable naming of short hyper-text links. Consider the context of links, such as providing a link labeled "back" to return to the calling page, can be confusing when not clearly indicating purpose.

If you wish to hide the descriptive link with style sheets, use an inline style change to match the font color to the background color. If you use static HTML, then the *font* attribute is also an option.

The following graphic is a screen shot of an image that has uses the “D-Link” technique. The code for this image immediately follows the screen shot.

Exhibit 6-2.2.4

Using Descriptive Links and Appropriate Use of Blank Alternates

Percentage of Cars Through Toll Booth

| Vehicle Type | Percentage |
|--------------|------------|
| Cars | 75% |
| Trucks | 20% |
| Other | 5% |

[\[D\]](#)

Trucks up from 10 percent over last years figures!

Figure A. D-Link Example — Pie Chart showing percentage of cars through toll booth.

Figure B. HTML code for image in Figure A

```

<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
  <meta http-equiv="content-type"
    content="text/html; charset=ISO-8859-1">
  <title>Using Descriptive Links Example</title>
</head>
<body>
<a href="chart.html" title="Description of Toll Fees Pie Chart"> [D]</a>
<br>
<br>
 Trucks up from 10 percent over last years figures!<br>
</body>
</html>

```

6-2.2.5 Appropriate Use of Blank Alternates

The example in Figure B in exhibit 6-2.2.4 also shows the proper use of the blank *alt* attribute. The code illustrates how images used in Web content that may have no real meaning should be tagged with a blank *alt* attribute in the image tag. Make sure that you do not put a blank space between the quotation marks in the *alt* attribute.

6-2.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, as it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Manually test for valid HTML markup.
- Use automated tools to test for valid HTML markup.
- Mouse over the image to verify that descriptive text appears for each image.
- Ensure that images (not used for comprehension and navigation) used for format only contain blank ALT tags.
- Turn images off in the browser. Each image used for comprehension or navigation must be replaced with its equivalent descriptive text.
- Click on the links provided by the *longdesc* attribute or “D-Link” to ensure that the user is taken to the appropriate description.
- If a non-text element is critical to the understanding of content, and an ALT tag description will be lengthy, provide a long description (“longdesc”).

6-2.4 References

The following reference is provided for more information on this topic but must not be used in place of the Postal Service guidelines contained in this handbook. Also see Chapter 8, Video and Multimedia Products, of this handbook. If these references conflict with the above techniques, you must defer to the Postal Service guidelines.

- Text equivalents
<http://www.w3.org/TR/WCAG10/wai-pageauth.html#tech-text-equivalent>

6-3 Multimedia

Provide equivalent alternate formats or alternate access methods for any multimedia presentation and synchronize them with the presentation (Section 508, Provision §1194.22b).

6-3.1 Rationale

Audio content, without captions or transcripts, is not accessible to the hearing impaired. Videos, without text descriptions, are not accessible to the visually impaired. Audio and video combined is multimedia. Separately, audio and video are each subject to the non-text requirements. In both cases, information needs to be provided in an alternate format or access method.

6-3.2 Techniques

Provide synchronized captions or transcripts of audio content.

Provide a descriptive text equivalent for audio clips if the information in the audio clip helps the user to interpret the content of the Web content. (See the requirements for non-text elements in section 6-2.)

Provide text and audio descriptions of the action occurring in the video. (See the requirements for non-text elements in section 6-2.)

Provide a link to any player or plug-in that is required to render multimedia.

Update alternate formats and access methods concurrently with the audio and video Web content.

6-3.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Search for all audio and video objects. Ensure that each audio and video object has a corresponding equivalent accessible alternate format.
- Verify that the content of the alternate format or access method is equivalent to and updated concurrently with the content of the primary audio and video Web source. Ensure that no information has been lost and that the meaning has remained the same.
- Use screen reader software to ensure that the player or plug-in is accessible.
- Ensure that the plug-in or player itself is compliant with the Access Board's standard, 36 CFR 1194.21 (Software Applications and Operating Systems).

6-3.4 References

The following reference is provided for more information on this topic but must not be used in place of the Postal Service guidelines above. If these references are in conflict with the above techniques, you must defer to the Postal Service guidelines.

- Synchronize equivalents
<http://www.w3.org/TR/WCAG10-TECHS/#tech-synchronize-equivalents>

6-4 Color

Web pages must be designed so that all information required for navigation or meaning is independent of the ability to identify specific colors (Section 508, Provision §1194.22c).

6-4.1 Rationale

People who cannot differentiate between certain color combinations or have some other visual impairment may have difficulty navigating or interpreting content that depends on the ability to identify color.

When foreground and background colors are too close to the same hue, they may not provide sufficient contrast between colors.

6-4.2 Techniques

Identify information in such a way that the message is not conveyed through color alone. For example, do not instruct a user to “select an item from those listed in green.” Instead, relay that information without referring to color. Use colors and shades that have sufficient contrast.

6-4.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Test the content without colors by viewing it with a monochrome monitor or changing the color scheme (i.e., change to “High Contrast White” (Control Panel > Display > Appearance > Scheme > High Contrast White).
- Ensure that the Web content information can be viewed when using high-contrast appearance settings (e.g., white on black).
- Print the page onto a black and white printer and review.

6-4.4 References

The following references are provided for more information on this topic but must not be used in place of the Postal Service guidelines above. If these references conflict with the above techniques, you must defer to the Postal Service guidelines.

- Colors
<http://www.w3.org/TR/WCAG10-TECHS/#tech-color-convey>
- Web/Computer Color Chart for the Colorblind
<http://www.toledo-bend.com/colorblind/colortable.html>

6-5 Style Sheets

Documents must be organized so that they are readable without an associated style sheet. Documents must be constructed so that the user does not need style sheets to interpret the content of the Web page. This does not prohibit the use of style sheets (Section 508, Provision §1194.22d).

6-5.1 Rationale

If not organized properly, style sheets may make it difficult for Web pages to be read accurately in browsers that do not support style sheets or in a browser in which a user has disabled support for style sheets. Visually impaired users may disable or overwrite style sheets so that the font size, colors, or contrast of the Web content is easier to read.

Style should affect the visual makeup of the document without affecting content. When considering the use of a table for page content layout, consider creating a style sheet instead. When Web content combines CSS with HTML layout, you must test both the accessibility of the content as developed and as modified by simulated user-enabled style sheets. The information conveyed must be understood when viewing the document without the associated style sheet.

6-5.2 Techniques

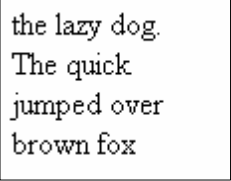
6-5.2.1 Design So That Alternate Style Sheets Can Be Applied

Arrange style commands so that the contents make sense when read in the correct order without the associated style sheets. Make sure that the web content is useable when the style sheets have been disabled in the browser or the user has elected to activate their user-developed style sheets. If the content has changed or is not useable, provide an alternative Web page in an accessible alternate format. The following two examples show the use of style commands. The first example is incorrect because it only uses horizontal positioning. In the second example, both horizontal and vertical positioning are used which leads to proper ordering of the sentence, regardless of whether the style sheets are disabled.

Exhibit 6-5.2.1a

Example of an Incorrect Use of Style Sheets**Figure A.** Screen capture of incorrectly formatted CSS Web content

In this example, if a user elected to use his or her own style sheets, or if style sheets were disabled in the browser, the sentence would read incorrectly.



```
the lazy dog.  
The quick  
jumped over  
brown fox
```

Figure B. HTML code for Figure A

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">  
<html>  
<head>  
  <meta content="text/html; charset=ISO-8859-1"  
    http-equiv="content-type">  
  <title>Incorrect Use of Style Sheets Example</title>  
</head>  
<body>  
  <div class="part4">the lazy dog. </div>  
  <div class="part1">The quick</div>  
  <div class="part3">jumped over</div>  
  <div class="part2"> brown fox</div>  
</body>  
</html>
```

Exhibit 6-5.2.1b

Example of Style Sheets Used Correctly

In this example, if a user elected to use his or her own style sheets, or if style sheets were disabled in the browser, the sentence would read correctly.



Figure A. Screen capture of correctly formatted CSS web content.

Figure B. HTML code for Figure A

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
  <title>Correct Use of Style Sheets Example</title>
  <style type="text/css">
    .part1 /* The quick */ { padding-left: 0; position: absolute; top: 0;
    color: red; font-size: 14pt;
    font-family: copperplate gothic bold, fantasy, sans-serif }
    .part2 /* brown fox */ {padding-left: 100px; position: absolute; top:
    25px;
    color: brown; font-size: 10pt;
    font-family: times new roman, desdemona, serif }
    .part3 /* jumped over */ { padding-left: 300px; position: absolute; top:
    40px;
    color: purple; font-size: 18pt;
    font-family: desdemona, times new roman, serif }
    .part4 /* the lazy dog */ { padding-left: 350px; position: absolute;
    top:70px;
    color: blue; font-size: 24pt;
    font-family: fantasy, copperplate gothic bold, sans-serif }
  </style>
</head>
<body>
<div class="part1">The quick</div>
<div class="part2"> brown fox</div>
<div class="part3">jumped over</div>
<div class="part4">the lazy dog. </div>
</body>
</html>
```

6-5.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Turn the style sheets off in the browser. Ensure that all content can be understood and that it is in the same logical order as intended by the author.
- Create a blank style sheet and configure your browser to use this style sheet to override all non-user-defined style sheets. Ensure that the resulting content can be understood using assistive technology and that it is in the same logical order as intended by the author.

6-5.4 References

The following reference is provided for more information on this topic but must not be used in place of the Postal Service guidelines given above. If these references conflict with the above techniques, you must defer to the Postal Service guidelines.

- Style sheet organization
<http://www.w3.org/TR/WCAG10-TECHS/#tech-order-style-sheets>

6-6 Image Maps

Use client-side image maps, whenever possible, in place of server-side image maps (Section 508, Provision §1194.22e). Provide equivalent redundant text links for all server-side image map hot-spot areas (Section 508, Provision §1194.22f).

6-6.1 Rationale

Screen readers cannot read images. However, image maps can be made accessible if a descriptive text equivalent is provided for each hot-spot area.

A client-side image map contains all of the information about the image map. It is stored within the HTML document and interpreted through the browser.

The server-side image map is external to the HTML document. A server-side image map requires a script on a Web server that identifies the hot spots and their corresponding uniform resource locators (URL). When a server-side image map is used, browsers cannot indicate to the user which URL will be followed when a region of the map is activated.

6-6.2 Techniques

Use the *alt* attribute within the and <AREA> tags to provide a descriptive text equivalent for all hot-spot areas of a client-side image map.

Exhibit 6-6.2a

Example of a Client-Side Image Map

Figure A. Client-side image map

The following graphic is a screen shot of an image map. The code for this client-side image map immediately follows the screen shot.



Figure B. HTML code for Figure A

```
<a href = "worldmap.map">
<img src = "worldmap.gif" width = "180" height = "100" alt = "World Map"
border = "0" usemap = "#worldmap" ismap>
</a>
<map name = "worldmap">
<area shape = "rect" _coords = "43,39,63,81" href = "http://www.southamerica.com"
alt = "SouthAmerica">
<area shape = "rect" _coords = "22,9,49,36" href =
"http://www.northamerica.com" alt = "NorthAmerica">
<area shape = "rect" coords = "73,26,105,67" href = "http://www.africa.com"
alt = "Africa">
<areashape = "rect" coords = "131,51,156,70" href
="http://www.australia.com" alt = "Australia" >
<area shape = "default" nohref>
</map>
```

Hot spots located in a server-side image map must have redundant text links.

Exhibit 6-6.2b

Example of a Server-Side Image Map (With Redundant Text Links)

The following code is an example of a server-side image map.

```
<a href = "img/imgmap1.map">
<img src = "imgmap1.gif" alt = "Please use the following links instead of this
imagemap." ismap>
</a>
<br><br>
[ <a href = "a.htm">Section A</a> | <a href = "b.htm">Section B</a> | <a
href = "c.htm">Section C</a> | <a href = "d.htm">Section D</a> | <a
href = "e.htm">Section E</a> ]
```

6-6.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Mouse over the active regions of the client-side image map to ensure that an equivalent text description appears for each hot spot.
- Verify that all redundant text links in a server-side image map work properly.

6-6.4 References

The following reference is provided for more information on this topic but must not be used in place of the Postal Service guidelines given above. If these references conflict with the above techniques, you must defer to the Postal Service guidelines.

- Redundant text links
<http://www.w3.org/TR/WCAG10-TECHS/#tech-redundant-server-links>

6-7 Tables

Tables must be constructed so that they can be easily interpreted by all users and communicate the intent of the author (Section 508, Provision §1194.22g, h).

6-7.1 Rationale

Screen readers have difficulty interpreting data if the tables are not designed properly. A sighted person can scan down a column and across a row of a data table. For a visually impaired person, listening to this same information with a screen reader can be a daunting task. When tables are created using software for generating HTML pages (e.g., HTML editors or office suites), the underlying source code may not be accessible using screen reader software. The techniques outlined in section 6-7.2 must be applied regardless of the software used to generate HTML.

There are three general uses for tables: data tables (simple and/or complex data), document layout tables, and forms within data tables.

If a data table has one logical level of row or column headers, it is a simple table. Complex tables are data tables that have more than one logical level of row or column headers.

When a table is used for layout purposes, ensure that the layout is not required to understand the information. The page content layout should be transparent to the interpretation of the page content.

Forms within tables are addressed in section 6-13.

6-7.2 Techniques

Use the <TABLE> tag primarily for the display of tabular data. Non-tabular tables may be used for layout if the table uses appropriate HTML to summarize the intent of the design.

Identify row and column headers for data tables. Associate data cells with their headers for all tables that have two or more logical levels of row or column headers. The table must be constructed so that it can be read logically from left to right and from top to bottom.

Where appropriate, use the <CAPTION> tag and/or the *summary* attribute for tabular data. It is not necessary to include summary attributes in data tables that are nested within a table. However, the outermost <TABLE> tag must contain a <CAPTION> tag and/or *summary* attribute. The content of the <CAPTION> tag is displayed on the screen. The contents of the *summary* attribute are read by the screen reader but not displayed on the screen.

6-7.2.1 Simple Tables

If a data table has one logical level of row or column headers, it is a simple table. There are two options for coding simple tables. The first option is to use the table header <TH> tag and the *id* and *header* attributes. The *id* attribute within the <TH> tag is used in the first cell of each column to define the column header. The *id* attribute within the table data <TD> tag is used in the first cell of each row to define the row header. The *header* attribute within the <TD> tag of all other cells is used to associate the cell with its corresponding row and column headers.

The second option is to use the *scope* attribute. The *scope* attribute associates a set of <TD> tags with the corresponding <TH> tag. The *scope* attribute within the <TH> tag is used in the first cell of each column to define the column header. The *scope* attribute within the <TD> tag is used in the first cell of each row to define the row header.

Exhibit 6-7.2.1 (p. 1)

Example of a Simple Table (Using the *header* and *id* Attributes)

The code for this table immediately follows the screen shot.

Figure A. Screen shot for a simple table that uses the *header* and *id* attributes

Rate Table for Priority Mail Global Guaranteed

| Weight not over (lbs) | Rate Groups 1 and 2 | Rate Groups 3 and 7 | Rate Groups 4 and 6 | Rate Group 5 | Rate Group 8 |
|-----------------------|---------------------|---------------------|---------------------|--------------|--------------|
| 0.5 | \$20.00 | \$24.00 | \$29.00 | \$40.00 | \$60.00 |
| 1 | \$31.00 | \$34.00 | \$41.00 | \$51.00 | \$72.00 |
| 2 | \$31.00 | \$34.00 | \$41.00 | \$65.00 | \$87.00 |
| 3 | \$42.00 | \$53.00 | \$60.00 | \$80.00 | \$102.00 |

Figure B. HTML code for Figure A.

```
<table width = 66% border = 1 summary = "This table summarizes the rates
for Priority Mail Global Guaranteed postage rates.">
<caption> Rate Table for Priority Mail Global Guaranteed</caption>
<tr>
<th id= "header1"> Weight not over (lbs)</th>
<th id= "header2"> Rate Groups 1 and 2</th>
<th id= "header3"> Rate Groups 3 and 7</th>
<th id= "header4"> Rate Groups 4 and 6</th>
<th id= "header5"> Rate Group 5</th>
<th id= "header6"> Rate Group 8</th>
</tr>
<tr>
<td id= "row1"><center>0.5</center></td>
<td header= "row1 header2"><center> $20.00</center></td>
<td header= "row1 header3"><center> $24.00</center></td>
<td header= "row1 header4"><center> $29.00</center></td>
<td header= "row1 header5"><center> $40.00</center></td>
<td header= "row1 header6"><center> $60.00</center></td>
</tr>
<tr>
<td id= "row2"><center>1</center></td>
<td header= "row2 header2"><center> $31.00</center></td>
<td header= "row2 header3"><center> $34.00</center></td>
<td header= "row2 header4"><center> $41.00</center></td>
<td header= "row2 header5"><center> $51.00</center></td>
<td header= "row2 header6"><center> $72.00</center></td>
</tr>
<tr>
<td id="row3"><center>2</center></td>
<td header="row3 header2"><center> $31.00</center></td>
<td header= "row3 header3"><center> $34.00</center></td>
<td header= "row3 header4"><center> $41.00</center></td>
<td header= "row 3 header5"><center> $65.00</center></td>
<td header= "row 3 header6"><center> $87.00</center></td>
</tr>
<tr>
<td id="row4"><center>3</center></td>
```

Exhibit 6-7.2.1 (p. 2)

Example of a Simple Table (Using the *header* and *id* Attributes)

```

<td header=" row 4 header2"><center> $42.00</center></td>
<td header=" row 4 header3"><center> $53.00</center></td>
<td header=" row 4 header4"><center> $60.00</center></td>
<td header=" row 4 header5"><center> $80.00</center></td>
<td header=" row 4 header6"><center> $102.00</center></td>
</tr>
</table>

```

Exhibit 6-7.2.1b

Example of a Simple Table (Using the *scope* Attribute)

The following graphic is a screen shot of a simple table that uses the *scope* attribute. The code for this table immediately follows the screen shot.

Figure A. Screen shot of a simple table that uses the *scope* attribute

| | L'Enfant | Rosslyn | Courthouse | L'Enfant |
|--------------|----------|----------|------------|----------|
| Bus 1 | 10:00 am | 10:30 am | 10:45 am | 11:00 am |
| Bus 2 | 11:00 am | 11:30 am | 11:45 am | 12:00 pm |
| Bus 3 | 12:00 pm | 12:30 pm | 12:45 pm | 1:00 pm |

Figure B. HTML code for Figure A

```

<table summary="The Postal Bus Schedule" border="1">
<tr>
<th width="70"></th>
<th scope="col" width="103" >L'Enfant</th>
<th scope="col" width="128" >Rosslyn</th>
<th scope="col" width="95" >Courthouse</th>
<th scope="col" width="141">L'Enfant</th>
</th>
<tr>
<td scope="row" width="70"><b>Bus 1</b></td>
<td width="103">10:00 am</td>
<td width="128">10:30 am</td>
<td width="95">10:45 am</td>
<td width="141">11:00 am</td>
</tr>
<tr>
<td scope="row" width="70" ><b>Bus 2</b></td>
<td width="103">11:00 am</td>
<td width="128">11:30 am</td>
<td width="95">11:45 am</td>
<td width="141">12:00 pm</td>
</tr>
<tr>
<td scope="row" width="70"><b>Bus 3</b></td>
<td width="103">12:00 pm</td>
<td width="128">12:30 pm</td>
<td width="95">12:45 pm</td>
<td width="141">1:00 pm</td>
</td>
</tr>
</table>

```


6-7.2.2 **Complex Tables**

When a data table has more than one logical level of row or column headers, it is a complex table. The *axis* attribute is used to create categories in a complex table.

The table used in the following example lists travel expenses at two locations (San Jose and Seattle) by date and category (meals, hotels, and transport).

The caption centered above the table reads, "Travel Expense Report."

The *axis* attributes or categories of the table are as follows:

- City.
- Travel dates.
- Meal expenses.
- Hotel expenses.
- Transport expenses.

The first row of the table contains these headers: "Meals," "Hotels," "Transport," and "Subtotals." The first row group shows the expenses in San Jose for those categories on August 25–26, 1997. Below that row group, the subtotals of all expenses in San Jose are listed.

The second row group presents similar data for expenses incurred in Seattle on August 27–28, 1997. Below that row, subtotals of all expenses in Seattle are listed.

The final row of the table lists the combined total expenses for San Jose and Seattle for "Meals," "Hotels," and "Transport." It also provides the total of all money expended on the entire report.

Exhibit 6-7.2.2b (p. 1)

Example of a Complex Table Using the axis Attribute

The following is a screen shot of a complex table. The code for the complex table immediately follows the screen shot and shows how to create categories using the *axis* attribute.

Figure A. Screen shot of complex table using the *axis* attribute

Travel Expense Report

| | Meals | Hotels | Transport | Subtotals |
|------------------|--------|--------|-----------|-----------|
| San Jose | | | | |
| 25-Aug-97 | 37.74 | 112.00 | 45.00 | |
| 26-Aug-97 | 27.28 | 112.00 | 45.00 | |
| Subtotals | 65.02 | 224.00 | 90.00 | 379.02 |
| Seattle | | | | |
| 27-Aug-97 | 96.25 | 109.00 | 36.00 | |
| 28-Aug-97 | 35.00 | 109.00 | 36.00 | |
| Subtotals | 131.25 | 218.00 | 72.00 | 421.25 |
| Totals | 196.27 | 442.00 | 162.00 | 800.27 |

Figure B. HTML code for Figure A

```

<table border = "1" summary = "This table summarizes travel expenses
incurred during August trips to San Jose and Seattle">
<caption>
Travel Expense Report
</caption>
<tr>
<th></th>
<th id = "a2" axis = "expenses">Meals</th>
<th id = "a3" axis = "expenses">Hotels</th>
<th id = "a4" axis = "expenses">Transport</th>
<td><b><b>Subtotals</b></b></td>
</tr>
<tr>
<th id = "a6" axis = "location">San Jose</th>
<th></th>
<th></th>
<th></th>
<td></td>
</tr>
<tr>
<td id="a7" axis="date">25-Aug-97</td>
<td header = "a6 a7 a2">37.74</td>
<td header = "a6 a7 a3">112.00</td>
<td header = "a6 a7 a4">45.00</td>
<td></td>
</tr>
<tr>
<td id="a8" axis="date">26-Aug-97</td>
<td header = "a6 a8 a2">27.28</td>
<td header = "a6 a8 a3">112.00</td>
<td header = "a6 a8 a4">45.00</td>

```

Exhibit 6-7.2.2b (p. 2)

Example of a Complex Table Using the axis Attribute

```

<td ></td>
</tr>
<tr>
<td><b><b>Subtotals</b></b></td>
<td header = "a6 a2"> 65.02</td>
<td header = "a6 a3">224.00</td>
<td header = "a6 a4">90.00</td>
<td>379.02</td>
</tr>
<tr>
<th id = "a10" axis = "location">Seattle</th>
<th></th>
<th></th>
<th></th>
<td></td>
</tr>
<td id="a11" axis = "date">27-Aug-97</td>
<td header = "a10 a11 a2">96.25</td>
<td header = "a10 a11 a3">109.00</td>
<td header = "a10 a11 a4">36.00</td>
<td></td>
</tr>
<tr>
<td id="a12" axis = "date">28-Aug-97</td>
<td header = "a10 a12 a2">35.00</td>
<td header = "a10 a12 a3">109.00</td>
<td header = "a10 a12 a4">36.00</td>
<td></td>
</tr>
<tr>
<td><b>Subtotals</b></td>
<td header = "a10 a2">131.25</td>
<td header = "a10 a3">218.00</td>
<td header = "a10 a4">72.00</td>
<td>421.25</td>
</tr>
<tr>
<td><b>Totals</b></td>
<td>196.27</td>
<td>442.00</td>
<td>162.00</td>
<td>800.27</td>
</tr>
</table>

```

Exhibit 6-7.2.2c

Example of a Complex Table

Figure C. Complex table

The following is an example of a complex table. This example does not have HTML code provided but instead illustrates how tables can have multiple headings.

| Year | Vendor A | | Vendor B | |
|------|-----------|--------|-----------|--------|
| | Projected | Actual | Projected | Actual |
| 2001 | 23,400 | 28,980 | 29,000 | 28,850 |
| 2000 | 19,000 | 21,200 | 28,000 | 27,500 |
| 1999 | 18,250 | 23,000 | 26,400 | 27,000 |

6-7.3 **Testing**

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- For data tables, ensure that all of the relevant data, row headers, and column headers have been properly tagged and can be interpreted correctly.
- For data tables, test the tables with JAWS to ensure that they read logically left to right and top to bottom and that the content reads in the same order as intended by the author.
- Ensure that layout tables contain proper *summary* attributes or <CAPTION> tags (e.g., “this table is for layout only”).

6-7.4 **References**

The following references are provided for more information on this topic but must not be used in place of the Postal Service guidelines given above. If these references conflict with the above techniques, you must defer to the Postal Service guidelines.

- Identify row and column headers
<http://www.w3.org/TR/WCAG10-HTML-TECHS/#tables>
- Postal Service accessible tables FAQs
http://cto.usps.gov/pls/itprodnp/page?psite_id=10&pnode_id=305

6-8 Frames

Framesets must be constructed so that the user does not have to depend on visual cues to navigate the site. Frames must be titled with text that facilitates frame identification and navigation (Section 508, Provision §1194.22i).

6-8.1 Rationale

Frames must be titled so that screen reader software can identify the frame content to the visually impaired. Untitled frames make it difficult for the visually impaired to navigate the Web content.

Descriptive titles allow assistive technology (such as screen reader software) to identify the frame content to end users.

6-8.2 Techniques

6-8.2.1 Avoid Using Frames

Organize the presentation of your Web pages so that the use of frames is minimal or not required.

Consider that users may not be able to link or create bookmarks to frame content. A bookmark or forwarded link would show the initial frameset and not the information the user wants to reference. Additional problems include effectively disabling the 'back' button on users browsers, disabling printing of content (only one of the frames prints), lack of indexing by search engines, and frames can be inaccessible to users of screen magnification software and some hand-held devices.

6-8.2.2 Provide Frame Titles

Provide meaningful *title* attributes for each <FRAMESET> and <FRAME> tag. The titles must describe the content of the frame page and individual frame.

Exhibit 6-8.2.2

HTML Code for Frames

```
<html>
<head>
<title>USPS Electronic Documents </title>
</head>
<frameset cols= "10%, 10%, 80%" title = "Our library of electronic
documents">
<frame src = "logo.html" title = "Company logo frame">
<frame src = "navigation.html" title = "navigation frame">
<frame src = "maincontent.html" title = "Company main content">
<noframes> <a href = "companyindex.html" title = "Company index">
Select to go to an index of the Company's Web site. </a>
</noframes>
</frameset>
</html>
```

Use Valid HTML 4.01 Frameset DTD. HTML 4.01 specifies three document type definition (DTDs) with one specifically for Framesets. Authors must include the following document type declarations in their frame documents:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Frameset//EN"
"http://www.w3.org/TR/html4/frameset.dtd">
```

6-8.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Ensure that there is a meaningful page title for HTML pages that contain the <FRAMESET> tag.
- Ensure that every <FRAMESET> tag has a meaningful title.
- Ensure that every <FRAME> tag has a meaningful title.
- Test the non-frame version or alternative format provided to verify that it has the same functionality.

6-8.4 References

The following references are provided for more information on this topic but must not be used in place of the Postal Service guidelines given above. If these references conflict with the above techniques, you must defer to the Postal guidelines.

- Frame title
<http://www.w3.org/TR/WCAG10-HTML-TECHS/#frame-names>
- Postal Service accessible frames FAQs
<http://blue.usps.gov/508web/FramesHelp.html>
- Alternatives to frames
<http://www.w3.org/TR/WCAG10-HTML-TECHS/#alt-frames>
- HTML version information (including frameset DTDs)
<http://www.w3.org/TR/html4/struct/global.html#version-info>

6-9 Screen Flicker

Web pages must not use flashing or blinking text, objects, or other elements having a flash or blink frequency between 2 and 55 cycles per second (2.0 Hz and 55.0 Hz). If flashing is present, provide a way to change the frequency (Section 508, Provision §1194.22j).

6-9.1 Rationale

Screen items that flash or blink can cause seizures or other involuntary responses, particularly if they flash in high intensity, with high contrast, and in the frequency range between 2 and 55 cycles per second (2.0 Hz and 55.0 Hz).

Web applications must not use flash or blink rates in the range stated above. This includes, but is not limited to, flashing text, rapid screen rewrites, images that cycle on and off, and repeatedly changing or animated user interface elements. If software uses flashing or blinking user interface elements, a feature that allows the user to change their frequency or disable the function must be provided.

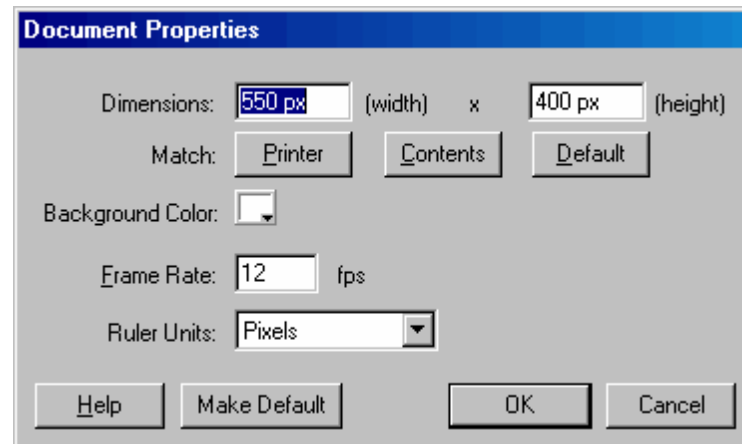
6-9.2 Techniques

Provide graphics that do not flash or blink in the frequency range between 2.0 Hz and 55.0 cycles per second (between 2 Hz and 55 Hz).

When Web applications do provide flashing elements such as animated images, development techniques must be used to allow the user to control certain aspects of the flashing element's flash or blink rate (to alleviate the risk of producing adverse physical affects). These development techniques include the following:

- a. Providing the user with the ability to adjust the flash speed (see exhibit 6-9.2).
- b. Minimizing the area of the screen that is flashing (smaller areas are less likely to cause seizures).
- c. Avoiding flashing that has a high level of contrast between light and dark, such as light colors and dark colors (some individuals are more susceptible to high-intensity flashing).
- d. Providing a feature that will completely disable the flashing or animation.

Exhibit 6-9.2

Dialog Box Controlling Frame Rate of Animation**6-9.3 Testing**

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Ensure that a display that flickers or flashes is not within the frequency range of 2 to 55 cycles per second (2Hz to 55Hz) and that there are no quick changes from dark to light (like to strobe lights).
- Ensure that page content is not affected if animations are disabled.

6-9.4 References

The following reference is provided for more information on this topic but must not be used in place of the Postal Service guidelines given above. If these references conflict with the above techniques, you must defer to the Postal Service guidelines.

- Avoiding flicker
<http://www.w3.org/TR/WCAG10-TECHS/#tech-avoid-flicker>
- Effective color contrast
http://www.lighthouse.org/color_contrast.htm

6-10 Equivalent Text Content

When compliance cannot be achieved, provide an alternate format or alternate access method that will be used in addition to, or in place of, the primary Web page, site, application, information, links, or data (Section 508, Provision §1194.22k).

6-10.1 Rationale

Alternate formats or access methods are intended to be equivalent to the primary Web source in both content and functionality and must be updated concurrently with the primary Web source.

URL hyperlinks or text links such as “click here” do not clearly indicate the destination or purpose of the link. Descriptive text links enable assistive technology to provide information that describes the destination or purpose of the link.

6-10.2 Techniques

6-10.2.1 Use Standard Accessible Formats

Create your original Web application, information, links, and data in a standard, accessible format so that text-only or alternate formats are not needed.

When updates to the primary content are made, ensure that the text-equivalent or alternate formats are updated concurrently.

When converting documents created by office suites into HTML for compliance, table headers and image *alt* attribute tags are required. When converting such documents into plain text formats for the Web, data tables must be converted so that the text data is equivalent to the original data table.

Exhibit 6-10.2.1

Example of a Microsoft Word® Table

Figure A. Microsoft Word® table

| Service | Benefits | Allowable Weight |
|---|--|-------------------------|
| Priority Mail® service (for expedited delivery) | <ul style="list-style-type: none"> ▪ Dependable 2 to 3 day delivery* ▪ No extra cost for Saturday and residential deliveries | Up to 70 lbs. |
| First-Class Mail® service | <ul style="list-style-type: none"> ▪ Great option for postcards, letters and large envelopes ▪ Simply affix a stamp and send | 13 oz. or less |

Automatically generated HTML, such as created by Microsoft Word's File, "Save As Web Page" option, must comply with the other requirements for HTML in this chapter. HTML content generated by this method is frequently *not* valid HTML and should be checked by using a web page validation tool such as that provided by the W3C® Markup Validation Service.

Viewing the generated HTML in a Web browser is not a sufficient test of valid HTML. Frequently, Web browsers ignore defects in coding in order to provide a better end-user experience. The invalid HTML or defects may interfere with assistive technology, may not render properly, or may not render any of the intended information.

6-10.2.2 Descriptive Hyperlinks

Descriptive text links must state more than "click here." However, they must not be so wordy that they interfere with efficient browsing. Nondescriptive URL hyperlinks, such as "click here" convey little meaning to the visually impaired and must not be used. The display of a URL must be accompanied by the corresponding descriptive text link.

Note: Examples from this document's reference sections illustrate proper use of a descriptive link.

Exhibit 6-10.2.2a

Example of the Proper Use of a Descriptive Link

Go to USPS Home Page (<http://www.usps.com>)

Exhibit 6-10.2.2b

Example of Link Images

Use the alt attribute to provide a descriptive text equivalent for an image that is used as a link.



```
<input alt="Search USPS.com" border="0"
width="50" height="15" src="/common/images/style2_7/search_home.gif"
type="image" value="Search" name="search" tabindex="2">
```

6-10.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- When converting office suite documents into HTML, table headers and image *alt* attribute tags are required.
- Verify that the content of the alternate format or alternate access method is equivalent to both the content and functionality of the primary Web content.

- Update the alternate format content concurrently with the primary Web content. Ensure that no information has been lost and that the meaning remains the same.

6-11 Scripting Languages

When pages use scripting languages to display content or to create interface elements, the script must provide meaningful text that can be read by assistive technology. If an accurate message cannot be conveyed by the results of the script, provide an equivalent alternate format or access method (Section 508, Provision §1194.22I).

6-11.1 Rationale

Assistive technologies may not support some scripting languages. Scripting must follow Web standards; otherwise, a screen reader could read the content of the script as a meaningless mixture of numbers and letters.

Some browsers are unable to run scripts, and some users' browsers are configured not to run any scripts.

Web content must be accessible when the scripting is unavailable. The design of Web content should be secondary to being able to access that content.

Scripts must not interfere with assistive technology. Scripts frequently are used to change information and user focus. Test your scripts with accessible technology to ensure that your scripts do not create content that is inaccessible.

6-11.2 Techniques

If the results of a script cannot be accessed by assistive technology or if a meaningful message cannot be conveyed with the use of assistive technology, provide an alternate format or access method.

Use the <NOSCRIPT> tag to provide content to browsers that cannot run scripts.

Do not use redirects or scripts in place of Uniform Resource Locators (URLs). Scripts that directly call functions (e.g.,) must use a URL (e.g.,).

Provide accessible URLs if you use scripts functions in links (e.g.,).

Warn if scripts are changing focus, such as opening a link in a new window.

Browser detection routines must not require a specific browser client. Browser detection routines should always allow the user the option to view the Web content. Assistive technology and alternative Web browsers may meet the technical requirements to view your Web content but may not be

allowed to view that content by a poorly written or defective browser detection routine.

When recommending use of specific browsers, design your scripts to allow users to continue accessing the Web content even if they are not using the recommended browser.

Using the commonly used standards and recommendations, such as those created by the W3C, is always preferred.

When creating scripts that detect specific browser versions, ensure that you only identify user agent strings or browsers that you know do not *function* with the content of your Web page. Do not require a specific browser for viewing the Web content.

The alternative format or access method must be used in addition to, or in place of, the primary Web content. The alternate format must be equivalent to the primary Web source in both content and functionality and must be updated concurrently with the primary Web source.

6-11.2.1 **Scripts**

Scripts that dynamically generate content that cannot be conveyed by assistive technology must have an equivalent alternate format or access method that can be read by assistive technology. This is an issue primarily in client-side scripting. For example, a script could dynamically generate drop-down menus with hypertext links. The script must follow the accessibility requirements to create descriptive text links, using the <TITLE> attribute of the *<a href>* tag. Do not use scripting to create graphics and menus that are inaccessible. All scripts must follow the other requirements in this chapter.

6-11.2.2 **Java Accessibility**

Accessibility-enabled Java applications are not dependent on machines that require assistive technology support. These applications will run on any Java platform, with or without assistive technologies. However, to provide access to Java applications, assistive technology requires more than the Java Accessibility API.

Sun's Java Accessibility Utilities help assistive technologies interact with applications developed using the Java Accessibility Application Program Interface (API). An application developer can use these APIs directly or indirectly using the Swing toolkit. Developers can create Java applications capable of interacting with assistive technologies such as screen readers, speech recognition systems, and Braille terminals.

Ensure that the version number of the Java Accessibility Utilities matches the version number of the Java Platform. For example, Java Accessibility Utilities v. 1.3 should be used if Java 2 Platform, Standard Edition v. 1.3 (JDK 1.3) is the version installed on the system where the evaluation is occurring.

Although accessibility support became available in SDK/JDK 1.1.x, it is best to use the Swing user interface development kit that is included in SDK 1.3 or higher. This will provide the highest level of accessibility functions.

6-11.3 **Testing**

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Test with Assistive Technology (AT) to ensure that all content from scripts, applets, or plug-ins is accessible.
- Use the most recent version screen reader with the Java Access Bridge and the Java plug-in to test Java applications for accessibility. Developers can ensure that the environment is set up appropriately by using the quick check utilities available from Sun.
- Verify that the content of the alternate format or alternate access method is equivalent to the content and functionality of the primary Web source and that it is updated concurrently with the primary Web source. Ensure that no information has been lost and that the meaning has remained the same.

6-11.4 **References**

The following references are provided for more information on this topic but must not be used in place of the Postal Service guidelines given above. If these references are in conflict with the above techniques, you must defer to the Postal Service guidelines.

- Java Accessibility
<http://www-3.ibm.com/able/accessjava.html>
- Writing accessible Java applications
<http://www-106.ibm.com/developerworks/java/library/j-access/>
- Sun's JAVA accessibility utilities
<http://www.sun.com/access/downloads/#sun>
- Java Developer's Forum
<http://developer.java.sun.com/developer/community/chat/index.html>
- Trace Center examples of accessible Java
<http://www.trace.wisc.edu/world/java/java.htm>

6-12 Plug-ins and Applets

Provide a link to a plug-in or applet that complies with the Access Board's standard, 36 CFR 1194.21 (Software Applications and Operating Systems), if a Web page requires an applet, plug-in, or other application to be present on the client system to interpret page content.

If the results of an applet or plug-in cannot be accessed by the assistive technology or if a meaningful message cannot be conveyed through the results of assistive technology, provide an alternate format or access method (Section 508, Provision §1194.22m).

6-12.1 Rationale

Web browsers may not have specific plug-ins necessary to view the content format. Users needing to install a plug-in may not have the file permissions needed to complete the installation of the required plug-in.

Plug-ins that provide information that is not essential to the understanding or navigation of the Web content can still be used and do not need an equivalent alternate format or access method.

Provide enough information directly in the Web content or in attribute tags to indicate that the information is not essential.

6-12.2 Techniques

Use the *alt* attribute to provide a text description for applets.

Create a hyperlink to information for downloading the correct plug-in next to the object that requires a plug-in.

Exhibit 6-12.2

Example of an Applet

```
<applet code = "gravity.class" width = "200" height = "250" alt="Java gravity
applet">
...
</applet>
Provide a text description of an object within the <OBJECT> tag.
Exhibit 6-12.2b Example of an Object
<object classid=java:gravity:class_width = "200" height = "250">
When gravity acts on an object, the weight
</object>
```

If a plug-in, applet, or other application is necessary to access the Web content, provide a hyperlink to the plug-in. The plug-in must comply with the Access Board's standard, 36 CFR 1194.21 (Software Applications and Operating Systems).

If the plug-in is not accessible, provide an alternate format or alternate access method to the content.

Note: Plugins for PDF formats are covered in Section 6-13, Forms.

6-12.3 **Testing**

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following step:

Ensure that the applet or plug-in is compliant with the Access Board's standard, 36 CFR 1194.21 (Software applications and Operating Systems).

6-12.4 **References**

The following references are provided for more information on this topic but must not be used in place of the Postal Service guidelines above. If these references are in conflict with the above techniques, you must defer to the Postal Service guidelines.

- HTML Techniques for Web Content Accessibility
<http://www.w3.org/TR/WCAG10-TECHS/#tech-scripts>

6-13 **Forms**

When electronic forms are designed to be completed online, the form must allow access via assistive technologies to information, field elements, and functionality, (e.g., associated controls required to complete, review, revise, and submit the form, including directions and cues) (Section 508, Provision §1194.22n).

6-13.1 **Rationale**

Screen readers may have difficulty navigating through interactive forms without the required modification to the form.

Forms may require a timed response (e.g., security functions). Assistive technologies may prevent users from completing online forms within the required time limit.

6-13.2 **Techniques**

Construct electronic forms (for completion online) so that assistive technologies (such as screen readers) can relay the relevant field descriptors when tabbing from field to field. Use logical tabbing order consistently throughout the form.

The assistive technology must be able to edit fields and allow users to read back and/or revise information previously entered into a field.

When a timed response is required, users must be alerted and given sufficient time to indicate that they need additional time to complete the form. (Refer to Section 6-16, Timed Responses).

A <LABEL> tag must identify all form controls, except for form controls that automatically have text descriptions associated with them, such as submit buttons. The <LABEL> tag must appear either immediately to the left or right or immediately above the field. Image buttons also need descriptive text associated with the form control. For forms that are laid out inside <TABLE> tags, the <LABEL> tag must appear in the same table cell as the form control.

An implicit label is a label that surrounds a form control with a <LABEL> tag. An explicit label uses the <LABEL> tag with the associated *for* attribute and with the equivalent *id* attribute in the form control. Explicit labeling techniques must be used, because implicit labels are not supported universally by screen readers. In addition, users will have difficulty interpreting the form if any text separates implicit labels from associated form controls.

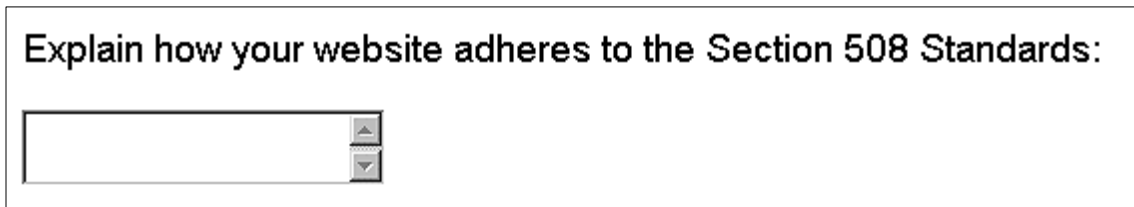
Exhibit 6-13.2a

Example of a Text Box and Buttons**Figure A.** Screen shot of a form with text boxes and buttons

Figure B. Relevant HTML code for Figure A

```
<form method=post action="/cgi-bin/cgi.pl">
<p>
<label for = "Name">Name:</label>
<input tabindex="1" type="text" id="Name" name="Name" size=30 maxlength
=75><br>
<label for = "Address">Address:</label>
<input tabindex = 2 type = text name = Address id=Address size =50
maxlength = 75>
</p>
<p>
<input tabindex = 3 type = submit name = SubmitButton value = Submit
Query>
<input tabindex = 4 type = reset name = ResetButton value = "Reset">
</p>
</form>
```


Exhibit 6-13.2b

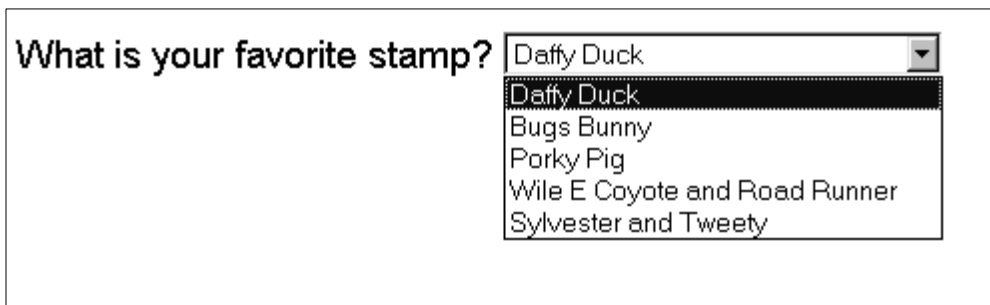
Example of a Text Area Box**Figure A.** Screen shot of a text area box

Explain how your website adheres to the Section 508 Standards:

Figure B. Relevant HTML code for Figure A

```
<form name=text_box method=post action=test.cfm>  
<label for=motives>Explain how your web content  
adheres to the Section 508 Standards:</label>  
<p><textarea id=motives name=motives tabindex=1></textarea>  
</p></form>
```

Exhibit 6-13.2c

Example of a Select Box**Figure A.** Screen shot of a select box

What is your favorite stamp?

Daffy Duck
Bugs Bunny
Porky Pig
Wile E Coyote and Road Runner
Sylvester and Tweety

Figure B. Relevant HTML code for Figure A

```
<label for=IfavstampI>What is your favorite stamp?</label>  
<select id=favstamp name=favstamp>  
<option value=1>Daffy Duck</option>  
<option value=2>Bugs Bunny</option>  
<option value=3>Porky Pig</option>  
<option value=4>Wile E Coyote and Road Runner</option>  
<option value=5>Sylvester and Tweety</option>  
</select>
```

Exhibit 6-13.2d

Example of a Check Box**Figure A.** Screen shot of check boxes

Choose a Stamp:

Bison

Red Fox

Eagle

Figure B. Relevant HTML code for Figure A

```
<form name=form1 method=post action=checkboxbox.cfm>
Choose a Stamp:<br>
<input id=bison type=checkbox name=checkbox value=checkbox tabindex=1>
<label for=bison>Bison</label><br>
<input id=fox type=checkbox name=checkbox2 value=checkbox tabindex=2>
<label for=fox>Red Fox</label><br>
<input id=eagle type=checkbox name=checkbox3 value=checkbox tabindex=3>
<label for=eagle>Eagle</label>
</form>
```

Exhibit 6-13.2e

Example of Radio Buttons**Figure A.** Screen shot of radio buttons

Choose a Product:

Cancelled Panes

Envelopes

First Day Covers

Figure B. Relevant HTML code for Figure A

```
<form name=form2 method=post action=radiobutton.cfm>
Choose a Product:<BR>
<input id=cp type=radio name=radio value=cp tabindex=1>
<label for=cp>Cancelled Panes</label><br>
<input id=envelopes type=radio name=radio value=envelopes tabindex=2>
<label for=envelopes>Envelopes</label><BR>
<input id=fdc type=radio name=radio value=fdc tabindex=3>
<label for=fdc>First Day Covers</label>
</form>
```

6-13.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- a. Test all forms for accessibility using JAWS. The form must be tested in both the forms mode and the Virtual PC cursor mode. The forms mode ensures that fields can be edited. The Virtual PC cursor mode ensures that responses can be read back or changed by the user.
- b. Verify that <LABEL> tags, text descriptions, tabbing order, and the like, read correctly.
- c. Verify that the user can ask for additional time to complete a form when timed responses are required.

6-13.4 References

The following reference is provided for more information on this topic but must not be used in place of the Postal Service guidelines given above. If these references conflict with the above techniques, you must defer to the Postal Service guidelines.

- USPS accessible forms FAQs
<http://blue.usps.gov/508web/FormsHelp.html>

6-14 Portable Document Format (PDF) Files

On Postal Service Internet and Intranet sites, all portable document format (PDF) files must have an additional alternate accessible format posted for use by the public and employees.

6-14.1 Rationale

PDF files may be completely or partially inaccessible to a screen reader or may be read in an illogical order by a screen reader. Posting an alternate format or access method along with the PDF is the only way to ensure accessibility.

An accessible PDF file uses tags to make the content of a character-based document available to a screen reader. Tags define the logical structure of the character-based document such as titles, headings, paragraphs, tables, etc. The underlying process of tagging a PDF file is similar to tagging an HTML or XML file. Original source files must be accessible before the conversion process begins, or the resulting PDF will likely be inaccessible.

The accessible tagged PDF file must be used with the accessible version of Adobe Acrobat Reader and a Microsoft Active Accessibility (MSAA) compliant screen reader such as JAWS.

6-14.2 Techniques

There are four basic steps to generating accessible tagged PDF files:

- a. A document's origin may be an original source file, a PDF file (character-based or image-based), or a paper document. Each of these requires different procedures. However, all of the procedures will result in a character-based PDF file.
- b. The second part of the process is to generate the initial tags (automatically or manually) for a character-based PDF file.
- c. The third part of the process is to fine-tune the tags for access by a MSAA-compliant screen reader and adherence to Postal Service Section 508 Web Accessibility Guidelines.
- d. The final step in the process is to determine accessibility and compliance by testing the tagged PDF file, using the most recent version of JAWS and the accessible version of Adobe Acrobat Reader.

To be an accessible and fully compliant tagged PDF file, the contents must be read in the logical order intended by the author, must be accessible to the MSAA compliant screen reader, and must adhere to the Postal Service Section 508 Web Accessibility Guidelines.

Since the MSAA compliant screen reader is required, accessible tagged PDF files can be tested only in the Windows environment. Unlike other PDFs, the accessible tagged PDF is not universally available to screen readers across all platforms. Therefore, an accessible and fully compliant version of a tagged PDF file must still have an alternate format or alternate access method posted on the Intranet and the Internet.

Provide an alternate format or access method that will be used in addition to, or in place of, the PDF file. Alternate formats or access methods must have equivalent content and functionality to the primary Web source and must be updated concurrently with the primary Web source. The *Postal Bulletin* is an example of providing alternate format in both .pdf and .html. (<http://www.usps.com/cpim/ftp/bulletin/pb2004.htm>).

For internal and external Postal Service Web content, that alternate format may be an HTML, plain text, or rich text format (RTF) file. For internal sites only, the alternate format **may** also be one of the native formats used by the Postal Service for its standard suite of office products (i.e., Microsoft Word®, Excel®, and PowerPoint®). Since files provided externally must be presented in alternate formats available to non-Microsoft platforms, standardizing on the non-Microsoft alternate formats (plain text (.txt) or rich-text format (.rtf) instead of MS Word (.doc) files, comma separated values (.csv) instead of MS Excel (.xls) files, hyper-text markup language (.html) instead of MS PowerPoint) is preferred.

In considering the options suggested above, keep in mind the extent of the conversion and review efforts, the resources required to maintain separate Web content, the size of the alternate file format and the time that it will take to load or download the file, the availability of a source file, and the relevance of existing PDF files. The conversion of PDF files requires extensive review, comparison, and validation.

Print-only PDF Forms that are available for download must have an associated text description that describes the form along with its number, title, and purpose.

Remember to provide a link to the acrobat reader or plug-in.

6-14.3 **Testing**

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Use the most recent version of JAWS, in conjunction with the accessible version of Adobe Acrobat reader, to test the tagged PDF file to determine whether the contents are in the logical read order intended by the author, all information and links are accessible by JAWS, and whether the file adheres to all other guidelines in this document.
- If additional revisions are needed, fine-tune the tags and test again until the tagged PDF file is both accessible with JAWS and compliant with the Postal Service Section 508 Web Accessibility Guidelines.
- Verify that the content of the alternate format or access method is equivalent with the content and functionality of the primary PDF file and is updated concurrently with the primary Web source. Ensure that no information has been lost and that the meaning has remained the same.

6-14.4 **References**

For more information on this topic, please check the following links:

- Adobe PDF accessibility information
<http://access.adobe.com/information.html>
- How to Create Accessible PDFs
<http://access.adobe.com/booklet1.html>
- Handbook AS-885, usps.com Development Process and Standards, Chapter 5, Section 5.5, File Formats
<http://blue.usps.gov/cpim/ftp/hand/as885/>
- WebAIM Microsoft Word Accessibility Techniques
<http://webaim.org/techniques/word/>
- WebAIM Adobe Acrobat Accessibility Techniques
<http://webaim.org/techniques/acrobat/>

6-15 Repetitive Navigation

Provide a method that will permit users of assistive technology the option to skip repetitive navigation links (Section 508, Provision §1194.22o).

6-15.1 Rationale

Insert a link that will allow the users to skip repetitive navigation links. It is common for Web authors to place navigation links at the top, bottom, or side of every new Web page. This technique can render the use of web content very difficult for persons using a screen reader because screen readers move through pages reading from top to bottom. The use of repetitive navigation links and URL links forces persons with visual impairments to re-read these links when moving to every new page.

Descriptive text links should make sense when read out of context (such as in a HTML bookmark list) by the screen reader.

6-15.2 Techniques

Insert a descriptive text link that will allow a user to skip the repetitive navigation links.

To facilitate easy tracking of page content, insert a descriptive text link before a repetitive navigation link, so that users will be able to go directly to the main content of the page.

This link may either be displayed to all users or be transparent so that it can be read only by a screen reader. To make a link transparent, use either a 1-pixel GIF that is the same color as the background or the hyperlink. The 1-pixel GIF can also be a transparent GIF. This GIF file must also have an *alt* attribute that states "Skip navigation" or a hyperlink that is the same color as the background that contains the text "Skip navigation" between the `<A href>` tag and the `` tag. The user must be taken to the main content of the page.

6-15.3 Testing

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users.

Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In your testing, perform the following steps, as applicable:

- Examine all repetitive navigation links. Ensure that you insert a descriptive text link that will allow a user to skip the repetitive navigation links. Check the link to make sure that it takes the user directly to the main content of that Web page.
- Examine links apart from the body of the document. Make sure that descriptive text still makes sense when read out of context by the screen reader.

6-16 Timed Responses

When a timed response is required, users must be alerted and given both a mechanism and sufficient time to indicate that they need additional time (Section 508, Provision §1194.22p).

6-16.1 Rationale

A disability can have a direct affect on the speed with which a person can read and move around Web content. The Web page session may expire, which can, in turn, cause an automatic refresh, an update of screen content, a redirection to another resource, a termination of a secure session, a disconnection, or a standby status, if a response is not received within a specified time.

Refreshing or redirecting the user to new Web content can confuse and make it difficult for users of assistive technology.

6-16.2 Techniques

6-16.2.1 Inactivity: When Applications Can Allow Users More Time

If the business or security requirement is that an application should timeout after a fixed period of inactivity, alert the user when a timeout is about to occur. Give the user ample opportunity to answer a prompt asking if the user needs more time.

Exhibit 6-15.2.1

Web Session Timeout Warning Dialog

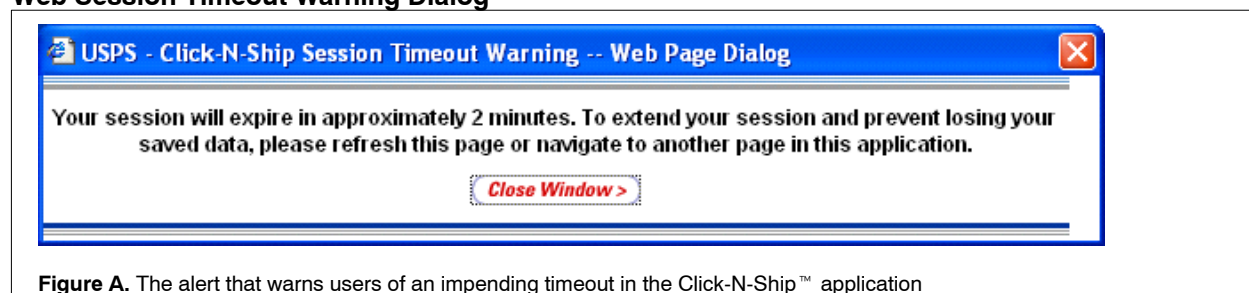


Figure A. The alert that warns users of an impending timeout in the Click-N-Ship™ application

Repeat the process until the user indicates that additional time is not required. If the user does not respond or indicates that no more time is needed, the timeout can take place.

6-16.2.2 Fixed Time Limit: When Applications Do Not Allow More Time

If the business or security requirement is that a timed feature in a Web application is only for a fixed session or time limit (combined activity or inactivity), then the user must be notified at the *start of the session* that the session will timeout after a fixed amount of time. Before the fixed time limit, an alert must communicate the impending timeout to the user. Then the user can be timed out at the appointed time. In such cases, a longer fixed session for persons with disabilities is not necessary.

The specific time that is appropriate from when the timeout message is given, to the point when the timeout takes place varies by the complexity of the application.

6-16.2.3 **Notifying Users That A Change Has Occurred**

Once a timeout has been reached, Web content must not be automatically updated or refreshed unless the update is based on a user selection or the user is notified a refresh is going to occur. An example of a user selection would be resetting of a Web application to an initial login page after the user selects “OK” on a timed logout notice.

6-16.2.4 **Automatic Updating of Web content**

Use the refresh meta-tag only when the user has requested auto-refresh. Notify the user of any changes resulting in a redirect. Most redirects are done without the user’s control. Web content developers should update content to reflect changes in hypertext links and notify users when it is known that redirects will occur.

An example of HTML code for an automatic refresh is given below:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01
Transitional//EN" >
<html>
<head>
<meta content="text/html; charset=ISO-8859-1"
  http-equiv="content-type" >
<title></title>
</head>
<body>
<meta content="3; url=http://www.usps.com"
http-equiv="refresh" >
You will be redirected to the United States Postal
Service in 3 seconds.
<meta http-equiv="refresh" content="3;
url=http://www.usps.com" >
</body>
</html>
```

6-16.3 **Testing**

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools and methods can help automate these methods, but automated testing must be accompanied by manual testing. In testing, perform the following steps, as applicable:

- Ensure that if given the option, any timeouts will allow a user to indicate that additional time is required.
- Ensure that timeouts notify the user that a timeout has occurred and the reason for the timeout. This includes notifying the user a redirect is going to occur.

- Ensure users are asked if they wish to have auto-refresh of content enabled. Default to not using auto-refresh.
- Ensure that users are notified of fixed time limits before they begin.

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Appendix 6-A

Web-Based Information and Applications Accessibility Checklist

Use this as a tool for determining if a Web-based application or information is compliant or accessible.

| | Requirement Number and Summary | Yes, No, or N/A | Comments |
|------|---|-----------------------|----------|
| 6-2 | Non-Text Elements. A descriptive text equivalent must be provided for all non-text elements that render information required for comprehension of the content, as well as those that facilitate navigation. Non-text items include images, video, graphs, charts, animation, and audio (Section 508, Provision §1194.22a). | | |
| 6-3 | Multimedia. Provide equivalent alternate formats or alternate access methods for any multimedia presentation and synchronize them with the presentation (Section 508, Provision §1194.22b). | | |
| 6-4 | Color. Web pages must be designed so that all information required for navigation or meaning is independent of the ability to identify specific colors (Section 508, Provision §1194.22c). | | |
| 6-5 | Style Sheets. Documents must be organized so that they are readable without an associated style sheet. Documents must be constructed so that the user does not need style sheets to interpret the content of the Web page. This does not prohibit the use of style sheets (Section 508, Provision §1194.22d). | | |
| 6-6 | Image Maps. Use client-side image maps, whenever possible, in place of server-side image maps (Section 508, Provision §1194.22e). Provide equivalent redundant text links for all server-side image map hot-spot areas (Section 508, Provision §1194.22f). | | |
| 6-7 | Tables. Tables must be constructed so that they can be easily interpreted by all users and communicate the intent of the author (Section 508, Provision §1194.22g, h). | | |
| 6-8 | Frames. Framesets must be constructed so that the user does not have to depend on visual cues to navigate the site. Frames must be titled with text that facilitates frame identification and navigation (Section 508, Provision §1194.22i). | | |
| 6-9 | Screen Flicker. Web pages must not use flashing or blinking text, objects, or other elements having a flash or blink frequency between 2 and 55 cycles per second (2.0 Hz and 55.0 Hz). If flashing is present, provide a way to change the frequency (Section 508, Provision §1194.22j). | | |
| 6-10 | Equivalent Text Content. When compliance cannot be achieved, provide an alternate format or alternate access method that will be used in addition to, or in place of, the primary Web page, site, application, information, links, or data (Section 508, Provision §1194.22k). | | |

| | Requirement Number and Summary | Yes, No, or N/A | Comments |
|------|---|--------------------------------|-----------------|
| 6-11 | Scripting Languages. When pages use scripting languages to display content or to create interface elements, the script must provide meaningful text that can be read by assistive technology. If an accurate message cannot be conveyed by the results of the script, provide an equivalent alternate format or access method (Section 508, Provision §1194.22l). | | |
| 6-12 | Plug-ins and Applets. Provide a link to a plug-in or applet that complies with the Access Board's standard, 36 CFR 1194.21 (Software Applications and Operating Systems), if a Web page requires an applet, plug-in, or other application to be present on the client system to interpret page content. If the results of an applet or plug-in cannot be accessed by the assistive technology or if a meaningful message cannot be conveyed through the results of assistive technology, provide an alternate format or access method (Section 508, Provision §1194.22m). | | |
| 6-13 | Forms. When electronic forms are designed to be completed online, the form must allow access via assistive technologies to information, field elements, and functionality, (e.g., associated controls required to complete, review, revise, and submit the form, including directions and cues) (Section 508, Provision §1194.22n). | | |
| 6-14 | Portable Document Format (PDF) Files. On Postal Service Internet and Intranet sites, all PDF files must have an accessible alternate format posted for use by the public and employees. | | |
| 6-15 | Repetitive Navigation. Provide a method that will permit users of assistive technology the option to skip repetitive navigation links. URL hyperlinks must have a descriptive text link. | | |
| 6-16 | Timed Responses. When a timed response is required, users must be alerted and given both a mechanism and sufficient time to indicate that they need additional time. | | |

7 Telecommunications Products

7-1 Overview

7-1.1 Contents

This chapter contains the specific electronic and information technology (EIT) performance requirements related to the following subpart of Section 508:

EIT Technical Standard 1194.23, Telecommunications Products, Provisions (a) thru (j).

7-1.2 Summary

7-1.2.1 Technology

The requirements in this chapter cover the following:

- Any product whose primary function is to provide **telephone functions** (i.e., 2-way voice communication), regardless of type, ranging from traditional business telephones to a wide variety of new and emerging products.
- For products with multiple functions, these requirements apply only to the telephone functions of those products. The convergence of telephony and information technology is blurring the line between different product types as a variety of new and innovative products are created (e.g., softphones, voice over IP, etc.).
- Telecommunications products that provide telephone functions include many components that are subject to the requirements in this chapter:
 - *Customer premises equipment:* Equipment employed on the premises of the Postal Service, including all headquarters and field operations (Post Offices, mail processing centers, etc.) to originate, route, or terminate telecommunications. “Customer premises equipment” includes all end-user devices, routers, switches, trunks/channels, call managers, servers, and software integral to such equipment used on the premises of the Postal Service. Customer premises equipment is distinguished from equipment used by carriers, referred to as “telecommunications equipment” (see below).

- *Telecommunications equipment:* Equipment, other than customer premises equipment, used by a carrier to provide telecommunications services. “Telecommunications equipment” includes all routers, switches, trunks/channels, call managers, servers, and software integral to such equipment used by the carrier.
- *Telecommunications service:* The offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used. Some examples of a telecommunications services include, but are not limited to, a voice over IP service, a voice mail service, or a wireless phone service.

Note: You may need to synchronize requirements in this chapter with requirements given in other chapters in this handbook. Products that provide telephone functions are subject to the requirements stated in this chapter. However, products often have features that are subject to requirements in other technical chapters (i.e., chapters 5–10). In addition, all products must be assessed using both the applicable specific requirements and the Functional Performance Criteria (see section 4-2.1). For example, using only the requirements in this chapter, it would be possible to design a touchscreen-only product (with no keypad and no voice output) that would be completely inaccessible to people who are blind. However, to ensure that the product would be accessible to people who are blind (i.e., and therefore conforming to Section 508 standards), the Functional Performance Criteria must also be applied.

Some examples of how the requirements in this chapter should be applied are offered here:

- *Example 1: Typical desktop telephone with answering machine capability.* This product is clearly covered by this chapter’s requirements, because its primary function is to provide telephone functions (i.e., 2-way voice communication). The product is also covered by the Functional Performance Criteria, as well as requirements in other chapters depending on the telephone design and features.
- *Example 2: A self-contained, single-function fax machine.* This stand-alone fax machine cannot be used to make a voice call (i.e., the unit has no handset or microphone). However, the unit has a speaker to enable the user to hear the line status. This product is both a self-contained, closed product and a telecommunications product. In this case, the applicable requirements are as follows:
 - From this chapter, only sections 7-6 (Caller ID and Similar Functions) and 7-12 (Controls and Keys) apply, as voice calls are not supported.

- From Chapter 9, Self-Contained, Closed Products, sections 9-2, 9-3, 9-4, 9-6, 9-8, 9-9, and 9-10 all apply. Section 9-5 does not apply, because no biometric form of identification is being used in this example. Section 9-7 does not apply, because the product does not deliver voice output for purposes of a conversation. Section 9-11 does not apply, because this is not a freestanding product. Sections 9-4, 9-9, and 9-10 may not apply, depending on whether the product has a display and on the type of display.
- All Functional Performance Criteria also apply.
- *Example 3: An “all-in-one” machine connected to a personal computer that includes a fax, scanner, printer, and copier.* This product cannot be used to make voice calls. The product includes software to be loaded on the personal computer. Therefore, this software must meet all applicable requirements in Chapter 5, Software Applications and Operating Systems. The unit itself is similar to the one in the second example and is covered under applicable requirements in this chapter, in addition to Chapter 9, Self-Contained, Closed Products, and the Functional Performance Criteria. To determine exactly which provisions apply to this “All-in-One” product, perform the same kind of analysis performed in the second example (i.e., the stand-alone fax machine).

7-1.2.2 Audience

This chapter applies to anyone who buys or develops telecommunications products or systems that include telephone functions for the Postal Service (i.e., Postal Service employees, suppliers, contractors, and business partners). Telecommunications products include information technology solutions of all sorts, consisting of simple or complex purchases or developed systems, and all associated data, information, training material, documents, and customer support.

7-1.3 Structure and Use

Each part of this chapter describes the specific requirements that support one or more provisions in the technical standards for telecommunications products. The technical standards of Section 508 were written primarily from a technology perspective. The Postal Service may consolidate some provisions to help Postal Service employees and business partners understand Postal Service compliance requirements from the perspective of designing for accessibility. Each specific requirement includes a rationale, techniques, testing methods, and references as shown below in section 7-2.

7-1, Overview

7-2, TTY Connection and Microphones (Provision §1194.23a)

- Rationale
- Techniques
- Testing
- References

- 7-3, TTY Signal Protocols (Provision §1194.23b)
- 7-4, Voice Mail, Auto-Attendant and Interactive Voice Response (IVR) Systems (Provision §1194.23c)
- 7-5, Time Interval Alerts for IVR Systems (Provision §1194.23d)
- 7-6, Caller ID and Similar Functions (Provision §1194.23e)
- 7-7, Volume Control (Provision §1194.23f)
- 7-8, Automatic Volume Reset (Provision §1194.23g)
- 7-9, Hearing Aid Compatibility (Provision §1194.23h)
- 7-10, Minimized Interference (Provision §1194.23i)
- 7-11, Transmission/Conducting Information (Provision §1194.23j)
- 7-12, Controls and Keys (Provision §1194.23k)
- Appendix 7-A, Checklist

7-1.4 Introduction to Telecommunications Accessibility

While looking at telecommunications barriers, it is helpful to understand the challenges that people with various disabilities face in using telephone functions, voice mail, auto-attendant, interactive voice response (IVR) systems, and other covered technologies. The need for a solution to these challenges resulted in the development of specific telecommunications product accessibility standards in Section 508. Here is a summary of those challenges:

- People with hearing disabilities are typically faced with challenges such as:
 - Lack of adequate TTY connections and signal support.
 - Interference with hearing technologies (i.e., hearing aids).
 - Lack of adequate volume control.
 - Insufficient audio quality for both analog/digital/synthesized output and recording/input (not addressed in Section 508).
 - Lack of playback control such as repeat and rewind functions (not addressed in Section 508).
- People with visual disabilities are typically faced with challenges such as:
 - Inaccessible LCD output for visually presented telephone function information such as caller ID, call logs, and internal directories.
 - Inaccessible hardware controls, keys, and switches.
- People with dexterity or mobility disabilities are typically faced with challenges such as:
 - Lack of timeout controls and saving of user input upon timeout.
 - Inaccessible hardware controls, keys, and switches.
 - Lack of error recovery features.

- Reliance on only one mode of input (e.g., voice or manual input).
- Lack of playback control, including transcription (not addressed in Section 508).
- Speech-impaired persons are typically faced with challenges such as:
 - Dependency on speech recognition.
 - Reliance on only speech-based input.
 - Incompatibility with communication aids.

While making telecommunications products accessible presents many challenges, the greatest barrier to compliance with Section 508 is lack of knowledge. Telecommunications products can often be made accessible with minimal difficulty and expense. In addition, buying or building accessible telecommunications products can benefit the population at large, not just people with disabilities.

7-1.5 **General Requirements**

Accessibility is accomplished by purchasing or developing telecommunications products that accommodate the widest range of users, including those with disabilities. Listed below are some general requirements that will help the Postal Service ensure that its telecommunications products continue to be accessible:

- The Postal Service should develop and procure telecommunications products that take advantage of built-in accessibility features when those features are available to both end users and product developers.
- The Postal Service should procure or develop telecommunications products that recognize and maximize the capabilities of the accessibility features installed and activated by a user (e.g., native hardware as well as installed assistive technology). Postal Service telecommunications products procurement personnel and developers should do the following:
 - Buy or build products that support industry and regulatory telecommunications standards. Accessibility features are often integrated with these standards to ensure accessibility in telecommunications usage (including input, compression, transmission, storage, and output). Standards related to each specific requirement are shown in the “References” area under that requirement.
 - Use standard hardware and software controls instead of custom controls. Standard controls often already support product accessibility features. Using them may eliminate the need for additional configuration or programming to provide explicit accessibility support, unless the behavior of the standard control has been enhanced.
 - Buy or build products that support a variety of input methods and output methods.

- Buy or build products that can query or detect the assistive technology in use and configure the telecommunications product automatically. For example, IVR systems might detect the presence of TTY signals and automatically route calls to the appropriate system or subsystem.
- The Postal Service will maintain standards for the following categories of **assistive technologies** that people with disabilities use to access telecommunications products:
 - Teletypewriter (TTY) devices or emulating software/modes: Help people with hearing disabilities by allowing them to transmit text-based conversations by telephone in real time.
 - Teleconference systems supported by assistive listening systems: Help people with hearing disabilities participate in meetings and other public settings by transmitting sounds using infrared or FM radio frequencies directly to a personal receiver (i.e., headphones) using a direct feed.

Finally, Postal Service employees are required to register certain software applications and operating systems in the Enterprise Information Repository (EIR) at <http://eir>. If a telecommunications product contains software applications, they may be subject to EIR requirements. This information will be used to report compliance and includes any related Section 508 noncompliance issues.

7-1.6 Testing for Compliance

When testing telecommunications products for compliance, it is crucial to be aware of the end-user environment. This includes an understanding of a product's stated accessibility features, assistive technologies typically used (such as a TTY), in addition to the product's input, compression, transmission, storage, and output methods.

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by people with disabilities and assistive technology users. If automated testing tools or integrated development environment (IDE) features are available to help automate these methods, they can be used but must be accompanied by manual testing. For example, a developer can use IDE tools to test for valid *syntax* (e.g., compression schema, input/output format or signal quality, etc.), but a manual inspection must still be done to validate *semantics* and proper *rendering*. In other words, the *meaningfulness* (i.e., *quality*) of the output must also be considered for end users who may have a disability or who may use assistive technology such as a TTY or a hearing aid.

7-2 TTY Connections and Microphones

Telecommunications products or systems that provide telephone functions (i.e., 2-way voice communication) and which do not themselves provide TTY functionality must provide a standard, nonacoustic connection point for TTYs. Microphones must be capable of being turned on and off to allow the user to intermix speech with TTY use (§1194.23, Provision a).

7-2.1 Rationale

People with significant hearing or speech disabilities commonly use text-based communication to converse over the telephone. Teletypewriters (TTYs) allow transmission of text conversations by telephone in real time. This provision addresses two different issues. One deals with the way a TTY is connected. This is important to ensure signal quality as well as to make the conversation possible in some cases. The other issue pertains to providing support for certain classes of TTY users who communicate by mixing speech and text on a call.

TTYs traditionally have had acoustic modems that use couplers on the top of the device. These are frequently used in offices where hearing people answer the telephone. The acoustic coupling mode allows a hearing call-taker to answer in voice and put the handset into the TTY coupler if needed for a TTY call. Thus, providing a handset that is compatible with a TTY is often helpful for these situations. However, a direct connection is often needed for its unique benefits, such as TTY-answering-machine capability and keyboard dialing. In addition, some TTY models do not have acoustic couplers.

Another important reason for requiring a direct connection is improved signal quality. Acoustic coupling is subject to audio interference from noise in the environment. Also, increasingly, handsets are diverse in design, and many do not fit well into standard acoustic couplers. If an acoustic modem picks up ambient noise while receiving data, it could display unintended characters, making the conversation difficult to understand. Therefore, a direct connection enables TTYs to obtain a clearer signal.

The requirement enabling the intermix of voice and TTY tones is important because it allows some people, depending on their abilities, to use TTYs more efficiently. Originally, TTY users would use TTYs for both typing and reading. Those that could speak, however, quickly determined that (if the other person could hear) they could pick up the receiver when it was their turn to talk and just speak to the other person (who would then type back on their turn). This was much faster and preferred by both sides of the conversation.

TTYs can be used in two distinct ways by people with disabilities, using Voice Carry-Over (VCO) and/or Hearing Carry-Over (HCO).

VCO is for people who have difficulty hearing clearly through the telephone and prefer to speak for themselves in a telephone conversation. Using a VCO telephone/TTY, the VCO user speaks directly to the other person. Everything

the other person says is typed by a Telecommunications Relay Service communication assistant and appears on the text display of the VCO user's telephone/TTY. The VCO user reads the text and no typing is necessary (see Figure A).



Figure A. VCO allows a caller to speak and receive typed responses from the other party (via a Telecommunications Relay Service communication assistant or relay officer).

HCO is for people who cannot or prefer not to speak, but who prefer to hear spoken conversation from the party they are calling. Using an HCO telephone or TTY, the HCO user types his or her side of the conversation and sends through a Telecommunications Relay Service communication assistant to the receiving party (who hears the spoken conversation voiced by the relay officer). The receiving party responds with spoken conversation that is heard directly by the HCO telephone/TTY user (see Figure B).



Figure B. HCO allows a caller to type conversation (relayed through a Telecommunications Relay Service communication assistant or relay officer), then hear spoken responses from the person they are calling.

VCO and HCO are most often used with the Telecommunications Relay Service (TRS). TRS is a service, mandated under Title IV of the Americans with Disabilities Act, which employs a live operator known as a communication assistant who facilitates the conversation between people using TTYs and those who are not using them.

Another aspect of this provision is a requirement that the microphone be capable of being turned on or off while using a TTY connection. This requirement was necessary to ensure that a telephone system would not prevent a telephone mouthpiece microphone from working when a TTY was being used with the telephone. For example, if a cellular telephone's headset jack is connected directly to a TTY, the microphone is sometimes disabled. This prevents TTY users from using the VCO option, since no voice input is possible unless the TTY is disconnected from the cellular telephone (at which time the cellular telephone microphone returns to normal operation).

7-2.2 Techniques

7-2.2.1 All Telephone Systems Must Provide TTY Connections

All telephone handsets and systems, regardless of device type, must provide a standard, nonacoustic connection for TTYs.

Individuals who use TTYs to communicate must have a nonacoustic way to connect TTYs, because acoustic-only connectors have a high data-error rate. Handsets on many telephones do not fit well with many TTY acoustic couplers, allowing interference from outside noise. Some digital wireline telephone systems do not offer standard, nonacoustic connectors. Use the following guidance to satisfy this requirement, depending on the type of system being considered:

- *Wireline equipment:* Wireline equipment must provide a standard non-acoustic connection (i.e., an analog RJ-11 jack) with a ring equivalence of 1 (in addition to the 1-ring equivalent provided for the telephone). The following additional guidance is offered:
 - **Ports that connect directly into the PSTN** must conform to FCC Part 68 standards for analog PSTN telephone lines.
 - For **digital wireline telephone systems** (e.g., multi-line business telephones operating through a PBX), provide either an analog drop line, a SmartAdapter, or data port that supports connection of an analog TTY. Note that both the capabilities of the system and the capabilities of handset units should be assessed when determining where to provide the analog connection. There may be cases in which the connection is best made at the PBX level by installing analog “drop” telephone lines where necessary, similar to what would be provided for a fax machine. In other cases, a “Smart Adapter” or DataPort may be necessary, similar to those used on many hotel telephones. Note that some adapters and converters have circuitry that determines the nature of the line and plug-in equipment and makes the adjustment automatically whereas others are manual.
 - For **analog wireline telephone systems only**, provide “direct-connect” TTYs that offer secondary benefits by supporting “auto answer” features. TTYs connected through an audio jack typically cannot act as answering machines — even if they have answering machine features in them (that work when they are

connected through an RJ-11 jack). To answer a telephone (or act as an answering machine), TTYs typically need to have a direct connection to the telephone line. In the future, there may be a standard mechanism for TTYs to answer the telephone when connected through an audio connection point (as opposed to a direct connection) so that TTY auto-answer or answering machines can work. Direct-connect TTYs should be connected only to analog telephones to prevent damage to the TTYs. A TTY should not be plugged directly into a digital telephone network, unless an analog jack or an analog converter is available.

- *Cordless analog wireless equipment:* The most common nonacoustic connection for cordless analog wireless use is a 2.5 mm headphone jack. Use of the 2.5 mm headphone jack carries limitations. Telephones with audio jacks and no RJ-11 jack will not work with many popular office TTY models that only have RJ-11 jacks, including many of the currently available TTYs with printers and answering machines.
- *Digital wireless (i.e., cellular) equipment:* The most common nonacoustic connection for cellular equipment is a 2.5 mm headphone jack that conforms to the TIA TSB-121 standard. Cellular telephones must support the VCO/HCO feature using either a standard nonacoustic connection or built-in functionality in the device hardware. Portable TTYs that are compatible with cellular telephones are designed for mobility and do not typically have printers or answering machines and can therefore be supported by the 2.5 mm headphone jack.

7-2.2.2 **Ring Signal Must Be Passed to TTY**

All telephones that use 2.5 mm headphone jack connectors to TTY connectivity must pass through the ring signal to the connector so that TTYs with built-in signal connectivity can detect the ringing.

In setting up a TTY, make sure that a suitable visual (or, in the case of a digital wireless or cellular telephone, vibrating) indicator, feature, or third party-device can be activated to alert a TTY user with a hearing loss when the telephone is ringing.

7-2.2.3 **User Must Be Able to Turn Microphone On and Off**

All telephone handsets and systems, regardless of device type, must offer the user the ability to turn the microphone on and off, so as to intermix speech and TTY signals without garbling of TTY text or reduction of speech quality.

When a TTY is connected directly into the network, it must be possible to turn the acoustic pickup (microphone) off (automatically or manually) so that background noise in a noisy environment will not interfere with the TTY signal. This supports use by people who prefer to communicate entirely by TTY. On the other hand, because some TTY users make use of speech for outgoing communications, the microphone enablement feature must be automatic or easy to switch back and forth, or a push-to-talk mode should be

provided. Therefore, telephone systems must support the ability for voice and TTY tones to alternate, not to be sent at the same time.

Note: Some TTY users have reported instances in which they connected a TTY to a cellular telephone, which resulted in a deactivation of the telephone's microphone. In those cases, there was no way to talk into the telephone (no way to turn the microphone on). This is frustrating to people with a hearing disability and intelligible speech who prefer to talk instead of type. People who are deaf and use the TTY for both typing and reading would have less of a problem with a connection that disables the microphone. However, even they would be concerned if the telephone was disabled to a point where it was unable to transmit tones for responding to IVR systems. TTY signals are not the same as "touch tone" sounds, and some TTYs may not readily make the necessary tones. On the other extreme, some TTY-phone setups keep a microphone on throughout the entire conversation (never toggling it off). This can cause a problem if the microphone picks up extraneous noise during the data reception mode, resulting in errors.

7-2.2.4 **Computers With Telecommunications Functions Must Support or Emulate TTYs**

Desktop or portable computers with telecommunications functions must provide TTY support or offer TTY emulating software, in addition to providing microphone disablement.

When telephone functions are provided on a desktop or portable computer, you must provide TTY support or offer TTY-emulating software, a microphone, and speakers. Some software and modems desktop or portable computers to function as a TTY telephone lines or over the Internet (e.g., VoIP). For such systems to comply with this requirement, they must allow speech and TTY tones to be intermixed (i.e., they must support VCO and HCO for both inbound and outbound calling), and they must allow the microphone to be disabled. For VoIP systems, use software or transmission or configuration techniques that enable full access to telephone functions. VoIP systems offer new possibilities for access to telephone functions by people with disabilities. They can be made accessible using various software components or configurations. For example, some software applications can be loaded onto the telephone server and configured to achieve accessibility, often without requiring any changes to the telephone hardware. Other techniques are currently being developed that would allow every telephone in an organization to be instantly capable of text communication (with and without voice carryover) by simply installing a software program in the call manager. A deaf person could then walk up to any of the 10,000 telephones in an organization and communicate via text (or text and voice), without needing any special equipment. This approach does not require any changes to the telephones themselves. It could be implemented using the VoIP telephones that are already installed.

7-2.3 Testing

- a. Inspect the product to identify if it provides telephone (i.e., 2-way voice communication) functions.
- b. Regardless of product type, if the product does provide telephone functions, conduct a visual inspection, using the following steps:
 - (1) Determine if product provides TTY functionality.
 - (2) If not, check for a standard, nonacoustic connection point (e.g., RJ-11, TIA TSB-121, etc.).
 - (3) Check for microphone off/on or “mute” switch or similar function.
- c. After conducting the visual inspection, conduct a performance test to ensure product complies with the requirements of this provision, using the following steps:
 - (1) Attach a TTY product to the product using the non-acoustic connection point.
 - (2) Test the product’s ability to allow the user to intermix speech with TTY on the same call to insure that VCO is functioning properly. On some telephones, when the microphone is muted, the telephone also prevents the TTY from transmitting through the direct-connect port. This is a problem.

7-2.4 References

The following references are applicable to the specific requirements stated here:

- Access Board, “Using a TTY”
<http://www.access-board.gov/publications/usingATTY/A2.html>
- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- FCC Order: Federal government must provide toll-free telecommunication relay service (TRS) Access
http://www.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00056.txt
- FCC Order: Wireless (cellular) providers must be able to transmit 911 calls made from TTYs
http://www.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00436.txt
- Alliance for Telecommunications Industry Solutions’ TTY Forum
<http://www.atis.org/atis/tty/ttyforum.htm>
- TIA TSB-121 Standard: Cellular Subscriber Unit Interface for TDD (2001)
<http://www.tiaonline.org/standards>
- Gallaudet University, “TTY Basics”
<http://tap.gallaudet.edu/TTY-Basics.htm>
- Gallaudet University: “Tools for field testing TTYs with wireless phones”
<http://tap.gallaudet.edu/TTYtools/>

- Guide to the Section 508 Standards for Electronic and Information Technology, Telecommunications Products (1194.23), Updated: June 21, 2001
<http://www.access-board.gov/sec508/guide/1194.23.htm>

7-3 TTY Signal Protocols

Telecommunications products that provide telephone functions (i.e., 2-way voice communication) must support all commonly used cross-manufacturer nonproprietary standard TTY signal protocols (§1194.23, Provision b).

7-3.1 Rationale

A two-way, real-time text-based telephone service for people with communication disabilities, based upon TTYs, was developed from teletype machines in the 1960s. The purpose of this provision is to ensure that TTY compatibility (with the signal, not just the connection point) is not overlooked. Specifically, this provision requires that mainstream telecommunications products that provide telephone functions support use of all commonly used cross-manufacturer, nonproprietary, standard signals used by TTYs. Some products compress or alter the audio signal in such a manner that standard signals used by TTYs are not transmitted or decoded properly, preventing successful TTY communication. TTYs that are most commonly used in the U.S. use the U.S. 45.5 baud Baudot protocol (ANSI/TIA/EIA 825). The 300 baud ASCII protocol is almost universally available, especially on dual mode TTYs, but it is less commonly used. These two codes (300 baud ASCII and 45.5 baud Baudot) are considered nonproprietary. Compliance with international standard ITU-T Recommendation V.18 would also meet this provision, but products complying with the ITU standard may not be commercially available.

Regardless of which nonproprietary standard protocol is supported, it is important that products and systems continue to support the protocol used by the TTYs currently in use by most people who are deaf or hard of hearing. However, the intent of this provision is to require support of more than just Baudot or ASCII. At present, only these two are commonly used in the U.S., but others may come into use later. While the Access Board is committed to supporting users of current devices, it does not want to exclude those who buy newer equipment, as long as such devices use protocols that are not proprietary and are supported by more than one manufacturer. Of course, like all the requirements of these standards, this provision is subject to commercial availability, which is why the final rule used the phrase “commonly used.”

This provision applies to all telecommunications products that enable and support 2-way telephone functions. Some examples include the following: an analog or digital telephone system, a personal data assistant (PDA) that includes telephone functions, or a fax machine with handset *and* microphone. Telecommunications products that do not support 2-way telephone functions — for example, a fax machine with a line monitoring speaker only,

but that does not include either a handset with microphone or speakerphone — are not covered by this provision.

7-3.2 Techniques

All telecommunication equipment that provide telephone functions (i.e., 2-way voice communication) must support all commonly used cross-manufacturer, non-proprietary, standard signals used by TTYs.

Specifically, the equipment must support the U.S. 45.5 baud Baudot protocol (i.e., the TIA/EIA 825-A standard, “A Frequency Shift Keyed Modem for use on the Public Switch Telephone Network”) and the 300 baud ASCII protocol. Alternatively, the newer international standard ITU-T V.18 standard is sufficient to support the requirements of this provision. Note that using TTYs over wireless networks presents different issues than using TTYs over TTY over voice over IP (VoIP).

7-3.3 Testing

- a. Inspect the product to determine if it provides 2-way telephone functions (i.e., 2-way voice communication).
- b. Research the standard TTY signal protocols that support TTY use, and determine which apply to the product in question.
- c. Refer to standard methods and tools that exist for TTY signal protocol testing for digital wireless. Apply a consistent approach to TTY protocol testing that uses standard test-case data scripts and automated protocol capture and analysis tools for measuring transmission accuracy (see Gallaudet University in “References”).
- d. Conduct a performance test on the product. Use overall error performance tests from the TTY Forum’s TTY Technical standards implementation tests suite and additional tests as appropriate (<http://www.atis.org/atis/tty/ttyforum.htm>). End-to-end performance tests using Gallaudet test scripts should be technology-independent.

7-3.4 References

The following references apply to the specific requirements stated here:

- Access Board, “International Telecommunications Union (ITU) Recommendation v.18”
<http://www.access-board.gov/telecomm/marketrep/appendices/v18.htm>
- Access Board, “Using a TTY”
<http://www.access-board.gov/publications/usingATTY/A2.html>
- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- Telecommunications Industry Association, Inc. (TIA), Standards related to TTYs
<http://www.tiaonline.org/standards/search.cfm?keyword=TTY>

- ANSI/TIA-825-A-2003 Standard: A Frequency Shift Keyed Modem for Use on the Public Switched Telephone Network
http://www.tiaonline.org/standards/search_results2.cfm?document_no=TIA%2D825%2DA
- Gallaudet University's Technology Access Program: V.18 New Modem Standard with TTY Capacity
<http://tap.gallaudet.edu/v18.htm>
- Alliance for Telecommunications Industry Solutions' TTY Forum
<http://www.atis.org/atis/tty/ttyforum.htm>
- FCC Order: Federal government must provide toll-free telecommunication relay service (TRS) Access
http://www.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00056.txt
- FCC Order: Wireless (cellular) providers must be able to transmit 911 calls made from TTYs
http://www.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00436.txt
- Guide to the Section 508 Standards for Electronic and Information Technology, Telecommunications Products (1194.23), Updated: June 21, 2001
<http://www.access-board.gov/sec508/guide/1194.23.htm>
- Gallaudet University's Technology Access Program: TTY Basics
<http://tap.gallaudet.edu/tty%2Dbasics.htm>
- Gallaudet University's Technology Access Program: V.18: New Modem Standard with TTY Capacity
<http://tap.gallaudet.edu/v18.htm>

7-4 Voice Mail, Auto-Attendant, and Interactive Voice Response (IVR) Systems

Voice mail, auto-attendant, and interactive voice response telecommunications systems must be usable by TTY users with their TTYs. (§1194.23, Provision c).

7-4.1 Rationale

Interactive Voice Response Systems (IVRs) have become a common means for agencies to manage their calls and save labor costs for common functions, such as routing calls by user selection from a voice menu, health care enrollment, or automated job line announcements. These services provide a number of functions including voice mail, and increasingly, unified messaging, auto-attendant, call routing, information delivery, and interactive voice response. However, for people who use TTYs, these labor-saving services often present barriers.

For example, many hearing-impaired TTY users cannot understand prompts indicating which telephone buttons to push when encountering IVRs. In other cases, users calling through a telecommunications relay service may not be given enough time to respond and get timed-out by the IVRs. Auditory

information when typed to a TTY user via relay may not include necessary spacing or punctuation to help a consumer understand sections of what is being conveyed. TTY users have discovered that some voice-mail systems corrupt TTY data left in voice-mail boxes. Moreover, as IVRs replace receptionists, operators, and other customer support methods, TTY users may actually lose services that they previously relied on and may be completely unable to call anyone in an agency (even if the person has a TTY on their desk) because they cannot get through the automated receptionist.

Such IVR systems not only must be fully functional for people who are calling in while using a TTY but must also be fully functional to people who subscribe to the voice-mail service and use a TTY to access it. Voice-mail systems that allow TTY users to retrieve and leave TTY messages are now available. This provision does not require telephone systems to provide voice-to-text conversion capabilities. IVR products that provide TTY users all of the same functions and information as they do for non-TTY users, such as reading streaming text, leaving messages, and managing personal voice mail have been available for more than a decade. This software should not be confused with other software on the market that is designed to allow computers to transmit and receive TTY code for live communication.

This provision applies to all devices that incorporate IVR functionality, such as voice mail systems, auto-attendant, and interactive voice response systems.

7-4.2 **Techniques**

7-4.2.1 **Voice Mail, Auto-Attendant, and IVR Systems Must Be Accessible to TTY Callers**

Voice mail, auto-attendant, and interactive voice response systems must be usable by TTY callers, both to leave and retrieve messages and to use the system features.

Making voice mail, auto-attendant, and IVRs “usable” involves two tasks: ensuring the IVR has the technical capabilities needed for TTY compatibility and implementing menus and messages so they are TTY-compatible. TTY users (both the caller and the receiver) must be able to navigate and use all end-user functions of IVRs independently without relying on a telecommunications relay service (i.e., IVRs should be able to send and receive TTY signals directly). The TTY character-error rate should ideally be no greater than that experienced by non-TTY users. The benchmark used for wireless TTY compatibility is an average error rate of no higher than 1 percent. TTY users must have sufficient time to read and respond before the system times out. Assume that TTY users will have a DTMF (i.e., touchtone) enabled TTY configuration, such as telephone with TTY attached, wireless telephone with TTY attached, or DTMF-enabled TTY. Time limits for user response based on those requirements in section 7-5 should be considered for the IVR system to be “usable,” as this provision requires. The

following methods are recommended (see also requirements in Section 7-5, Time Interval Alerts for IVR Systems):

- **Establish a separate number for TTY users with the TTY-compatible voice mail, auto-attendant, and interactive voice response system at that number.** If a separate number for TTY users is used, it must be equally publicized.
- **For systems that support multiple language messaging, use software that recognizes the TTY tones and then treats them as a language variant.** In this approach, messages are delivered to TTY users, much as some users might choose a language and receive messages in their preferred language. One challenge with this approach is that many TTY callers do not make TTY tones until they see the call is answered with a “Hello GA” TTY message. Therefore, they may not readily get connected to the TTY channel in a voice mail, auto-attendant, and interactive voice-response system. There are methods (as described below) for eliciting a response from the caller in TTY that could then be used to do the automatic switchover.
- **Provide a parallel system for TTY calls, accessed from the initial message in the message tree.** In this approach, a TTY call is identified, using the same greeting heard by non-TTY callers. This may be done by using integrated messages that contain both Baudot (TTY text) and voice content in such a way that both voice and TTY users can be served from a single voice file. In this technique, an initial message starts with a “HD” or “HLD” in Baudot to tell TTY users to hold. After this, the voice message plays, followed by a 5-second pause during which the hearing caller should enter a key to enter the message tree. After the pause and voice message to the hearing caller, the voice message is repeated in TTY tones. The hearing caller is thus routed to the audio messaging system and the TTY caller to the TTY messaging system. This setup would need to be designed to minimize delay in the sending of an initial TTY greeting, or TTY users will not recognize that they have called anything other than an exclusively voice-based system.

7-4.2.2 **IVRs Must Offer Access In a Way That Does Not Require User Speech**

IVRs that use speech-recognition features must offer at least one mode of operation and information retrieval that does not require user speech or they must offer support for assistive technology used by people with disabilities.

For example, speech-enabled IVRs can ask users to speak an account or employee ID number or enter it using the telephone keys.

7-4.2.3 **Notify User When Touch-Tone Response Is Required**

Communicate clear requirements to the user for entering DTMF responses (e.g., “touch tones”).

Interactive voice response systems often require a user to enter DTMF tones to access a customer service line (e.g., enter their extension number) or to make menu selections. In addition, telephone calling cards may require users to enter a personal identification number via DTMF. Depending on the users’ equipment, these tones may be entered directly via a push-button telephone or through the dialing system of a TTY. Note that DTMF tones are not the same as TTY tones, and TTYs make DTMF tones only when set in a “keyboard dialing” mode. Not all TTYs can generate DTMF tones, so the ability to generate DTMF tones with the telephones is important. Users with TTYs in the acoustic mode or with telephones connected in parallel with a direct-connect TTY can enter DTMF tones directly from their telephone. Vendors of TTY products can provide further information on how users may enter DTMF tones.

7-4.2.4 **TTY Users Must Have Full Access to Voice Mail**

Offer TTY users the same central voice-mail system answering service as non-TTY users.

Since the voice-mail system of the agency should be completely TTY-compatible, TTYs with answering machine functionality should not be needed (though the voice mail may or may not be easier to use), since TTY users could have their telephone answered by the central voice mail system like everyone else. If TTY-accessible answering machines are used instead of TTY-accessible voic mail, they must provide high enough fidelity to record and play back TTY tones accurately.

7-4.3 **Testing**

- a. For IVR systems and products, identify the set of voice mail, auto-attendant, and interactive voice response functions that apply. This must include all of the operational functions (which excludes maintenance and setup features) required to be used by the end-users of the system.
- b. Inspect the product using the checklists provided by the Alliance for Telecommunications Industry Solutions’ Interactive Voice Response Accessibility Forum (http://inclusive.com/ivr_access/). There are checklists for “Voice IVR” and “TTY IVR.” Complete both checklists to verify compliance with this provision.
- c. Inspect the product using the Human Factors and Ergonomics Society’s Guidelines for “Human Factors Engineering of Software User Interfaces — Interactive Voice Response (IVR) and Telephony” (see “Reference” below). These guidelines are compatible with ISO/IEC IS 13714, “Information technology — Document processing and related communication — User Interface to Telephone-based Services — Voice Messaging Applications,” but is less specific than the specifications in ISO/IEC IS 13714 (<http://www.atis.org/pub/IVR/HFES-200-5.pdf>).

7-4.4 References

The following references are applicable to the specific requirements stated here:

- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- Gallaudet University's Technology Access Program: Voice Mail and IVR
<http://tap.gallaudet.edu/IVR.htm>
- Alliance for Telecommunications Industry Solutions' IVR Accessibility Forum
<http://www.atis.org/atis/ivr/ivrhom.htm>
- Inclusive.com: IVR Accessibility
http://inclusive.com/ivr_access/
- ITU-T (ITU Telecommunication Standardization Sector): DTMF Standard
<http://www.itu.int/home/>
The ITU-T is a committee of the International Telecommunications Union (ITU). The ITU-T is responsible for making technical recommendations about telephone and data communication systems. DTMF (Dual-Tone Multi-Frequency) tones are those used by touch-tone telephones for tone dialing.
- ISO/IEC IS 13714 (1994). Information technology — Document processing and related communication — User Interface to Telephone-based Services — Voice Messaging Applications
<http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=22721>
ISO 13714 is the most detailed of the three standards, but also the narrowest. It applies to voice mail and voice messaging, specifically and cannot be applied in its entirety to IVR systems.
- Human Factors & Ergonomics Society: HFES 200.5: "Human Factors Engineering of Software User Interfaces – Interactive Voice Response (IVR) and Telephony"
<http://www.atis.org/pub/IVR/HFES-200-5.pdf>
- The Telephone Speech Standards Committee (TSSC) user interface guidelines for speech-enabled or speech-recognition business IVR applications.
<http://portal.acm.org/citation.cfm?doid=360405.360435>
TSSC is a relatively informal industry group consisting of representatives from companies developing speech-enabled IVRs for business transactions. The committee is developing standardizing terminology and definitions and set of common tasks across applications for which there will be standardized commands and prompts.

7-5 Time Interval Alerts for IVR Systems

Voice mail, messaging, auto-attendant, and interactive voice response telecommunications systems that require a response from a user within a time interval must give an alert when the time interval is about to run out and must provide sufficient time for the user to indicate more time is required (§1194.23, Provision d).

7-5.1 Rationale

When a system requires a user to respond within a specified time, some people with mobility or dexterity disabilities or those using TTYs where they must read the messages may have difficulty completing actions before the timeout. TTY users may require extra time to interact with voice mail, messaging, auto-attendant and interactive voice response systems. For these users, limits on response time can present a real frustration and barrier to using such systems.

Another class of users that often have problems with voice mail, messaging, auto attendant, and interactive voice response systems are TTY users of the Telecommunications Relay Service (TRS). The TRS is a federally mandated system (Title IV of the ADA) that exists in all states, primarily to provide a translation function for TTY callers. This process is slower than audio calls. Voice mail, messaging, auto-attendant, and interactive voice response systems may timeout before the TTY caller can receive the system's message in TTY code from the CA and type in their response. In addition, when multiple choices are offered, TTY callers may need to clarify the options with the communication assistant before understanding their choices. For TRS users, response time limits are a significant barrier.

This provision is also very pertinent to users of a type of relay service known as Speech to Speech (STS). STS callers do not use TTYs. STS callers have speech disabilities and use specially trained STS CAs to repeat what they are saying so that the other party can understand them. Sometimes more than one attempt is necessary for the CA to understand what the person is saying before the CA can begin to pass the message on. Also, due to other physical disabilities, the STS user may also have difficulty entering DTMF tones in a timely fashion. Designers are reminded that this timeout provision applies to all users of voice mail, messaging, auto-attendant, and interactive voice response systems, not just to TTY users.

For these reasons, this provision requires that users be alerted when a time limit is approaching and that they be given the option for extending the time. Ideally, users will have the option of overriding the timed response and will be able to take as much time as required to enter their responses. Alternately, users may continually be alerted to the timeout and extend it as long as they need, until they can effectively respond to the system, as long as user's input is not erased each time a time extension is evoked and granted.

This provision applies to all voice mail, messaging, auto-attendant, and interactive voice response systems that require a user response within a specified time interval.

7-5.2 Techniques

7-5.2.1 Provide Warning Before Response Period Timeouts and Preserve User Input

When timed responses are required, provide a warning 5 seconds before response period timeouts and ensure preservation of user input.

IVR systems used by the Postal Service should minimally use timed responses. However, when a timed response is required, users must be given the option of indicating that additional time is needed to complete their response, especially when using a standard or STS telecommunications relay service. If additional time is requested, the information entered before the warning announcement must be preserved and the user should be allowed to continue inputting information from the point in the message flow where the warning was communicated. For example, if the user is required to enter information, such as a Social Security number, the announcement and ensuing interaction should not erase the information entered by the user to that point. Resetting the system to provide the user with another timed try (with no more time to complete it than the first time) is not sufficient to conform to the requirement of allowing the individual to indicate that more time is required. In addition, the alert should repeat at the end of each response period until the user successfully completes the entire operation (i.e., message flow) or intentionally exits the function so that a destructive timeout does not occur. Preservation of user input and granting extensions of response time have the added benefit of helping ensure that users do not tie up the system for extended periods of time.

7-5.2.2 Provide Control of Playback of IVR Messages

Where possible and practical, provide a way for users to repeat, slow down or increase the volume of IVR messages.

Some people with partial hearing loss only recognize some of the words in a message and may need to have messages repeated, repeated more loudly, or repeated more slowly so that they may comprehend what is being said.

7-5.2.3 Use Both Visual and Audible Alerts

Where possible and practical, provide multiple sensory mode alerts.

Multiple sensory methods can be used to alert users that the end of a response period is approaching. For example, in addition to having an audible alert inform a user that a timeout is about to occur, a visual alert (on a display) could accompany the audible alert for the benefit of users with hearing disabilities. If the alert is required for operation, this requirement would satisfy the Functional Performance Criteria (see section 4-2.1).

7-5.3 Testing

- a. Examine the IVR product to identify all cases in which the product or service requires a response within a time interval.
- b. Conduct a performance evaluation of the IVR product or service. For each case of a required response within a time interval, check the following:
 - Does the system give an alert when the time interval is about to run out?
 - Does the system allow the user to indicate that more time is required?
 - Does the system provide sufficient time for the user to indicate that more time is required?
- c. Does the system provide additional time as requested?
- d. Use the checklists provided by the Alliance for Telecommunications Industry Solutions' Interactive Voice Response Accessibility Forum (http://inclusive.com/ivr_access/). There are checklists for "Voice IVR" and "TTY IVR." Both checklists should be completed to verify compliance with this provision.
- e. Use the Human Factors and Ergonomics Society's Guidelines for "Human Factors Engineering of Software User Interfaces — Interactive Voice Response (IVR) and Telephony" (see "Reference" below). These guidelines are compatible with ISO/IEC IS 13714, "Information technology — Document processing and related communication — User Interface to Telephone-based Services — Voice Messaging Applications", but is less specific than the specifications in ISO/IEC IS 13714. (<http://www.atis.org/pub/IVR/HFES-200-5.pdf>)

7-5.4 References

The following references are applicable to the specific requirements stated here:

- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- Alliance for Telecommunications Industry Solutions' IVR Accessibility Forum
<http://www.atis.org/atis/ivr/ivrhom.htm>
- Gallaudet University's Technology Access Program: Voice Mail and IVR
<http://tap.gallaudet.edu/IVR.htm>
- Inclusive.com: IVR Accessibility
http://inclusive.com/ivr_access/

- ITU-T (ITU Telecommunication Standardization Sector): DTMF Standard
<http://www.itu.int/home/>
The ITU-T is a committee of the International Telecommunications Union (ITU). The ITU-T is responsible for making technical recommendations about telephone and data communication systems. DTMF (Dual-Tone Multi-Frequency) tones are those used by touch-tone telephones for tone dialing.
- ISO/IEC IS 13714 (1994). Information technology — Document processing and related communication — User Interface to Telephone-based Services — Voice Messaging Applications
<http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=22721>
ISO 13714 is the most detailed of the three standards, but also the narrowest. It applies to voice mail and voice messaging, specifically and cannot be applied in its entirety to IVR systems.
- Human Factors and Ergonomics Society: HFES 200.5: “Human Factors Engineering of Software User Interfaces — Interactive Voice Response (IVR) and Telephony”
<http://www.atis.org/pub/IVR/HFES-200-5.pdf>
- The Telephone Speech Standards Committee (TSSC) user interface guidelines for speech-enabled business IVR applications.
<http://portal.acm.org/citation.cfm?doid=360405.360435>
TSSC is a relatively informal industry group consisting of representatives from companies developing speech-enabled IVRs for business transactions. The committee is developing standardizing terminology and definitions and set of common tasks across applications for which there will be standardized commands and prompts.

7-6 Caller ID and Similar Functions

Where provided, Caller ID and other telephone function information that is available to other users of the same system must be provided to TTY users of that system, who may have visual impairments (§1194.23, Provision e).

7-6.1 Rationale

This provision addresses two different problems: 1) how to make information that is normally presented on a display accessible to users who cannot see displays, and 2) how to provide information to TTY users that is usually provided on some landline digital telephone systems. The second problem is an issue when TTY users do not use landline digital telephone systems, due to the potential for the system to corrupt TTY signals.

The kind of information pertinent to this provision is information about telephone functions. Many current office and wireless telephones have displays that provide information such as Caller ID or an indication of new voice mail messages to the user. Caller ID functions display both the name

and number of a caller. Someone with a visual disability might not be able to see this information and therefore would not experience “comparable access” to the telephone system, unless that information was provided in another format.

TTY users may have special problems obtaining this telephone function information, which is commonly transmitted and displayed via digital channels on landline telephone systems. TTY users have often been limited to the use of analog lines, which provide a connection point, support ring-signaling assistive technology, and avoid garbling of TTY through the digital telecommunications system (see sections 7-3 and 7-11). However, this approach does not provide some additional information provided through a digital telephone system. Therefore, this problem of TTY user telephone function information access needs to be addressed by design engineers for a telephone system to conform to the 508 standards. Supply Management contract officers should know that this is not a problem with all digital telephone systems.

Products and services that deliver, support, or provide special telephone function information, such as Caller ID, are covered by this provision. Automatic location identification (ALI), which displays a caller’s address, is also covered, but is less commonly used.

7-6.2 **Techniques**

7-6.2.1 **Provide “Talking Caller ID” Functions**

Where possible and practical, provide built-in “talking Caller ID” functions that make telephone function information available directly in at least one nonvisual mode.

Most commonly, the nonvisual format for presenting telecommunications information is audio, so built-in “talking caller ID” approaches that use speech to make textual information available would satisfy this provision.

7-6.2.2 **Provide Access to Telephone Information Through Assistive Technology**

For systems for which “talking Caller ID” is not possible or practical, provide indirect access to telephone function information via assistive technology in at least one nonvisual mode.

Making this information available to assistive technology allows users to “read” the text through refreshable Braille displays or hear it through screen readers and other. Many landline office telephone systems support the TAPI interface, which is a standard protocol allowing exchange of information between telecommunications equipment and information technology equipment, (i.e., telephones and computers, see References). Through a newer version of the TAPI protocol known as Extended TAPI, telephone function information can be transmitted and presented on a personal computer using a softphone or other software application. Software that will translate the information from the Extended TAPI protocol to a form usable by assistive software is now available. If the software is left running in the

background, the user may access (audibly or tactilely using assistive technology) the telephone number of an incoming call in the same length of time as someone looking at the telephone LCD display. A TAPI interface on a telephone not connected to a computer would probably not satisfy this provision unless the telephone had voice output of the visual information on its display.

7-6.2.3 **Provide Time-Sensitive Telephone Information Immediately**

When telephone function information is time sensitive (as it is with Caller ID), the information must be immediately available to the user without requiring action on the part of the user to access it.

When Caller ID and similar telephone function information is provided, devices must provide equivalent and timely access to the information, using either a direct approach such as “talking Caller ID” or an indirect approach via assistive technology compatibility. For example, if users have a “talking Caller ID” function on their telephones, the function must be user-selectable and be able to speak the Caller ID information immediately, if it is immediately displayed for other users.

7-6.3 **Testing**

- a. For telecommunications products that include Caller ID or similar functions, identify the Caller ID or similar functions that are applicable. This must include all of the operational functions (which excludes maintenance and setup features) that end users have to use.
- b. For customer premises equipment (CPE), or equipment employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications, do the following:
 - Determine if the product provides visual Caller ID. If it does, check for voice output (Talking Caller ID).
 - If the product does not include visual Caller ID, check for the ability to add an external device specifically providing talking caller ID.
 - Check for exposure of the Caller ID info to a computer workstation. For such products, check to see if software or a protocol (e.g., TAPI or extended TAPI protocol) is in use that will make Caller ID and other information available in least one non-visual mode.
- c. For telecommunication equipment, other than customer premise equipment, used by a carrier to provide telecommunications services, including software integral to such equipment (including upgrades), determine how the system provides caller ID information to the customer premises eEquipment (CPE).
- d. For either kind of product (equipment), if the Caller ID or other function information is time sensitive (as it is with Caller ID), check to see that the information is immediately available to the user without requiring user action to access.

7-6.4 References

The following references apply to the specific requirements stated here:

- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- Microsoft Telephony Application Programming Interfaces (TAPI, TSPI, MSPI)
<http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnanchor/html/tapitpimspi.asp>

7-7 Volume Control

For transmitted voice signals, telecommunications products that provide telephone functions must provide a gain adjustable up to a minimum of 20 dB. For incremental volume control, at least one intermediate step of 12 dB of gain must be provided (§1194.23, Provision f).

7-7.1 Rationale

People with hearing loss generally require additional volume to hear effectively. A user may not be able to understand speech at default volume levels. This provision enables people who are hard of hearing to increase their telephone volume gain to maximize their residual hearing. Many people with hearing loss are more sensitive to noise and less able to recognize words in the presence of noise than individuals with normal hearing. Therefore, increased volume assists these users in achieving a volume level and speech-to-noise ratio sufficient for their needs.

This provision applies to all telecommunications products that provide telephone functions (i.e., that transmit and receive a two-way voice signal), and for which the frequency response of the receiver is conducive to voice communication. Products that only provide one-way communications, such as speakers that give operating instructions to the user, are not covered by this provision.

This provision is consistent with the 1998 ANSI A117.1 document, “Accessible and Usable Buildings and Facilities” (see “references”). ANSI is the voluntary standard-setting body that issues accessibility standards used by the nation’s model building codes. This provision is also consistent with the Telecommunications Act Accessibility Guidelines and proposed revisions to the ADA and Architectural Barriers Act Accessibility Revised Guidelines.

7-7.2 Techniques

Telecommunications products that provide telephone functions (i.e., 2-way voice communication) must provide acoustic output (i.e., volume control) that is user-controllable and which provides amplification adjustable to a gain of at least 20 dB above the default volume.

The term **dB** refers to “decibel,” a unit of relative sound intensity or a logarithmic unit used to describe a ratio. When used with **Sound Pressure Level (SPL)** (e.g., 65 db SPL), dB expresses an absolute measure of sound pressure level (SPL, or against no sound). Most telecommunications standards now define gain in terms of **Receive Output Loudness Rating (ROLR)**, not SPL.

If a volume control (e.g., a calibrated wheel or slider) is provided that allows a user to set the gain anywhere from 0 to the minimum requirement of 20 dB gain above default, then there is no need to specify an intermediate (i.e., incremental) step of 12 dB. If an incremental volume control is provided (e.g., pressing a volume button repeatedly), one of the intermediate levels must provide 12 dB of gain above default. Some telephones are set with a higher default than others. These telephones are not given “credit” for providing a high default setting and must still provide 20 dB of gain above their default setting in order to conform to this provision. Some telephones may allow the user to reset the default volume. In these cases, the default is that setting that the manufacturer normally uses for the telephones at sales time.

7-7.3 Testing

- a. Conduct a manual inspection of the product or device’s telephone functions for presence of volume control. Determine the default volume level of the device.
- b. If the device provides continuous amplification via a calibrated wheel, slider or other control, do the following:
 - Measure the base (default) output and the maximum gain.
 - Ensure that the maximum gain is at least 20 dB above the default level.
- c. If the device provides discrete intermediate volume levels via a push button or other control:
 - Measure the gain at each incremental level, ranging from base (default) to maximum.
 - Ensure that the maximum gain is at least 20 dB above the default level.
 - Ensure that one of the intermediate volume levels is 12 dB above default level.

7-7.4 References

The following references apply to the requirements stated in this section:

- FCC Hearing Aid Compatibility Act
<http://www.fcc.gov/cgb/consumerfacts/hac.html>
- ICC/ANSI A117.1-1998 Standard: Accessible and Usable Buildings and Facilities
<http://webstore.ansi.org/ansidocstore/product.asp?sku=ICC%2FANSI+A117%2E1%2D1998>

- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- OSHA regulations
http://www.osha-slc.gov/OshDoc/Interp_data/119910401A.html
- FEC Voting System Standards, April 30, 2002: Provides some guidance on explicit volume levels
<http://www.fec.gov/pages/vssfina/vss.html>

7-8 Automatic Volume Reset

If a telecommunications product that provides telephone functions allows a user to adjust the receive volume, a function must be provided to reset the volume to the default level automatically after every use (§1194.23, Provision g).

7-8.1 Rationale

This provision applies to all telecommunications products that provide telephone functions and that allow a user to adjust the volume. It was adopted from the ADA Accessibility Guidelines, where it applies to public telephones used by many people. It also has roots in the FCC's Part 68 rule, which requires an automatic reset when a landline telephone is hung up after a call in which the volume exceeds 18 dB gain. This reset provision is a safety feature for handsets implemented by the FCC, and does not apply when a product is in hands-free (i.e., speakerphone) mode. The ability to override the reset is helpful to people with hearing loss who find it inconvenient to adjust their preferred amplification level for every call, especially on incoming calls. In other words, the telephone will be loud every time that they answer it.

In December 2000, when the Access Board published the Section 508 standards in the *Federal Register*, it wrote in the preamble that allowing override of the reset function would require a waiver from the FCC. Since that time, the FCC did, in fact, issue such a waiver in March 2001 (*http://ftp.fcc.gov/cgb/dro/vc_notic.doc*) that states specific conditions (see "Techniques" below). There is also a Memorandum Opinion and Order at (*http://ftp.fcc.gov/Bureaus/Common_Carrier/Orders/2001/da010578.doc*). On the basis of these events, the Access Board believes that a telecommunications product can conform to this provision if it has either a fixed automatic reset function or an optional override of that switch. This interpretation does not change the 508 standards, which still require an automatic reset function to be provided. It simply acknowledges that a manufacturer (via the FCC waiver) may choose to allow users the ability to override the volume reset function, if the manufacturer wishes to design a telephone that way.

It is important to draw attention to the word “function” in this provision. There is a difference between requiring an automatic reset and requiring a function to reset automatically. Requiring a reset after each call is a fixed action, whereas including reset as an option provides flexibility to turn that function switch on or off. This 508 provision requires a automatic reset function, which is a broader requirement because it allows an override. Provision 1194.23(g) does not preclude an override function. For safety reasons, however, it is recommended that the reset function on telephones normally used by people who are hard of hearing be deactivated only when those telephones will not be shared with other people.

7-8.2 **Techniques**

7-8.2.1 **Provide Acceptable, In-Range Default Volume Settings**

All telecommunications products that provide telephone functions and that allow a user to adjust the volume must provide acceptable, in-range default volume level settings.

The default level could be set anywhere by manufacturer or users within the acceptable ranges described in section 7-7.

7-8.2.2 **Provide Automatic Reset of Volume Level and User Override Functions**

All telecommunications products that provide telephone functions and that allow a user to adjust the volume must provide automatic reset of volume level and user override functions.

If a telecommunications product allows a user to adjust the receive volume, a function must be provided to reset the volume to the default level automatically after every use, and the user must be able to override this reset. Products that permit an override of automatic volume reset must comply with the terms in the FCC Report and Order discussed above under “Rationale.” The FCC granted its waiver on the basis that telephone manufacturers meet the following conditions (which are required as part of this requirement):

- The volume reset override switch must be labeled as such and located on the telephone in such a way as not to be accessible to accidental engagement.
- A bright indicator light must be prominently displayed on the front of the telephone and must light up when the override is engaged and the telephone is placed in an off-hook condition.
- Next to the light must be a warning that the amplification is at a high level.
- A caution on the use of the volume reset override switch must be included in the users’ manual.

- The telephone must include a warning printed in Braille that can be securely attached to the back of the handset, or, if the telephone has only a headset, above the dial buttons, to indicate that a high-volume setting may be engaged.

7-8.2.3 Provide Visual Indicator of Volume Setting

Where possible and practical, telecommunications products that provide telephone functions and that allow a user to adjust the volume must provide a visual indicator of volume setting that can be read before picking up the handset.

This is especially important in telephones that use the push of a button to increase volume via software internal to the telephone. This display design contrasts with telephones, which use dials, slides, or other mechanical volume controls that can be easily viewed.

7-8.3 Testing

- a. Conduct an inspection of the telecommunication product to determine if it provides receive volume control.
- b. Amplify the volume, then verify that the volume level automatically resets after use with amplification.
- c. Determine the default volume level and assess if the receive volume returns to default after use.
- d. Determine if the product has a feature to allow the user to override the automatic reset of volume level. If it does, ensure that the product has complied with the FCC waiver requirements stated in section 7-8.2.2.
- e. Determine if the product offers a visual indicator of volume setting that can be read before picking up the handset.

7-8.4 References

The following references apply to the requirements stated in this section:

- FCC Waiver of Hearing Aid Compatibility Volume Control Standards, March 2001, 47 C.F.R. § 68.317(f)
http://ftp.fcc.gov/cgb/dro/vc_notic.doc
- FCC Memorandum Opinion and Order
http://ftp.fcc.gov/Bureaus/Common_Carrier/Orders/2001/da010578.doc
- FCC Hearing Aid Compatibility Act
<http://www.fcc.gov/cgb/consumerfacts/hac.html>
- ICC/ANSI A117.1-1998 Standard: Accessible and Usable Buildings and Facilities
<http://webstore.ansi.org/ansidocstore/product.asp?sku=ICC%2FANSI+A117%2E1%2D1998>
- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default##telecomm>

- OSHA regulations
http://www.osha-slc.gov/OshDoc/Interp_data/119910401A.html
- FEC Voting System Standards, April 30, 2002: Provides guidance on explicit volume levels
<http://www.fec.gov/pages/vssfina/vss.html>

7-9 Hearing Aid Compatibility

Where a telecommunications product delivers output by an audio transducer which is normally held up to the ear, a means for effective magnetic wireless coupling to hearing technologies must be provided (§1194.23, Provision h).

7-9.1 Rationale

There are several different ways in which hearing-aid wearers use the telephone. Some use the microphone on their hearing aid to pick up sound from the telephone speaker (i.e., “acoustic coupling”). Some others use a hard-wired electrical connection between the telephone and the hearing aid (i.e., “direct audio input,” or “DAI”). A sizeable minority of hearing-aid wearers (typically, but not exclusively, those with higher degrees of hearing loss) use the telecoil feature found in many hearing aids to pick up the speech (i.e., “inductive coupling”). The term “hearing-aid compatibility” (HAC) as used in this section refers to inductive coupling or telecoil compatibility.

There are several problems that hearing-aid users contend with that lead them to choose inductive coupling. One is acoustic feedback, also known as *whistling* or *squealing*. This is caused when the telephone speaker is held against the part of the hearing aid with the microphone. Two other problems are that the speech signal is weakened as it passes across the distance between the telephone speaker and the hearing-aid microphone, and ambient noise may enter the hearing aid along with the speech.

The solution to these problems for many people is to bypass the microphone completely and change to the telecoil “T” setting on their hearing aid (colloquially called the “telephone switch” or “T-coil”). A T-coil is a small inductive receiver element located in a hearing aid. It is activated either manually using a small switch located on the hearing aid or by using a remote control supplied with some hearing aids. The input to the hearing aid will be through a magnetic field surrounding the telephone handset. By using a T-coil, a hearing aid can receive the magnetic field, and receive or demodulate the telephone speech from the signal. The advantage of receiving the speech signal as a magnetic signal rather than an acoustic one is that there is no acoustic feedback or background noise to deal with. This feature has made the T-coil option very popular with some hearing aid users. An estimated 20 percent of hearing aids in the U. S. are ordered with a T-coil option. This is what is meant by hearing-aid compatibility (HAC). HAC is common in telephones due to the Hearing Aid Compatibility Act of 1988, which requires HAC in all essential wireline telephones. That requirement is simply carried over to Section 508.

This concept is important, because some people with severe hearing loss are able to use the telephone only if they couple the hearing aid inductively to the telephone. It should not be assumed that a person who is hard of hearing will hear effectively with volume control alone.

The use of T-coils has widened to other applications. Some theaters and auditoriums have installed transmission loops, allowing T-coil users in the audience to receive the performance or presentation through a magnetic signal. Portable assistive listening systems have also been developed that transmit discussions and lectures from a microphone directly to an attendee's T-coil via a receiver with a magnetic coupler.

It is noteworthy that some cochlear implants (the new ear-level style) also have a telecoil incorporated in them. Previously, cochlear implant users could plug their speech processors into an adapter on landline telephones for direct listening. However, the inductive coupling method allows them to use telecommunications products effectively in a wireless fashion.

With developments in technology, new kinds of speaker elements were introduced. Some of these speaker elements produced no magnetic signal or one that is far lower, thus making it impossible to use a T-coil in those products. Because of this, in 1988, the Hearing Aid Compatibility Act was passed requiring all wireline and cordless telephones to provide a magnetic signal sufficient to support the use of a T-coil. The FCC enforces this industry requirement in Part 68 of its rules. In its rules, the FCC adopted EIA RS-504 as the technical requirements for hearing-aid compatibility.

This provision applies to both wireline and wireless telecommunications products that deliver an audio output to a transducer normally held to the ear, such as a traditional telephone handset or headset (**Note:** telephone "headsets" go over the ear, and should not be confused with earphones that go inside the ear). Currently, there is no FCC requirement or industry standard specifically concerned with defining HAC for wireless telephones, even though wireless telephones must comply with this provision because they do deliver audio output to a transducer normally held to the ear. Therefore, if the product is a fax machine that does not have a handset, this provision does not apply.

7-9.2 Techniques

7-9.2.1 Provide Support for Inductive Coupling

Telecommunications products that provide telephone functions and that deliver output by an audio transducer that is held up to the ear must emit a magnetic field sufficient for effective inductive coupling with hearing technologies.

These hearing technologies include hearing aids and cochlear implants equipped with T-coils. The signal provided must be within the useful range prescribed by the applicable industry standards in order to assure good reception with the wide variety of hearing aids. This provision is required because with developments in technology, new kinds of speaker elements have been introduced that produce no magnetic signal or one that is far

lower, thus making it impossible to use a T-coil in those products. Because of this, in 1988, the Hearing Aid Compatibility Act was passed, requiring all wireline and wireless telephones to provide a magnetic signal sufficient to support the use of a T-coil. The FCC enforces this industry requirement in Part 68 of its rules (FCC Part 68.316). In its rules, the FCC adopted EIA RS-504 as the technical requirements for hearing aid compatibility (HAC).

7-9.2.2 **Cellular Telephones Must Support Hearing Aid Compatibility**

Cellular telephones must follow special requirements in order to support hearing aid compatibility.

Currently, there is no FCC requirement or industry standard specifically concerned with defining HAC for wireless telephones. However, on July 10, 2003, the FCC modified the exemption for wireless telephones under the Hearing Aid Compatibility Act of 1988 to require that wireless telephone manufacturers and wireless telephone service providers make digital wireless telephones accessible to individuals who use hearing aids. The FCC ruling requires the following:

- Digital cellular telephone manufacturers must make at least two HAC-compliant handsets with reduced radio frequency emissions for each air interface (e.g., CDMA, TDMA, GSM) they offer available to carriers within 2 years. Each carrier providing digital wireless services, except for nationwide (Tier I) wireless carriers, must make at least two HAC-compliant handset models with reduced radio frequency emissions for each air interface it offers available to consumers within 2 years.
- Nationwide (Tier I) wireless carriers must offer two HAC-compliant handset models with reduced radio frequency emissions for each air interface they employ within 2 years or must ensure that one quarter of its total handset models are HAC-compliant with reduced radio frequency emissions within 2 years, whichever option yields a greater number of handsets.
- Digital cellular telephone manufacturers must make available to carriers at least two HAC-compliant handset models with telecoil coupling for each air interface they produce within 3 years. Each carrier providing digital wireless services must make available to consumers at least two HAC-compliant handset models with telecoil coupling for each air interface it offers within 3 years.
- Half of all digital cellular telephone models offered by a digital cellular manufacturer or carrier must be compliant with the reduced radio frequency emissions requirements by February 18, 2008.
- Manufacturers must label packages containing compliant handsets and must make information available in the package or product manual, and service providers must make the performance ratings of compliant telephones available to consumers.

In addition, the FCC established an exemption for digital cellular manufacturers and carriers that offer a minimal number of handset models. The FCC also encourages digital cellular telephone manufacturers and service providers to offer at least one compliant handset that is a lower-priced model and one that has higher-end features and encourages hearing-aid manufacturers to label their pre-customization products according to the ANSI C63.12-2001 standard.

7-9.3 Testing

- a. Conduct an inspection of the telecommunication product to determine if it provides audio output from a transducer in a handset or headset.
- b. Measure the magnetic field produced by the handset or headset microphone, or examine the manufacturer's product documentation:
 - Wireline telephones: Must adopt FCC Part 68 Hearing Aid Compatibility (HAC) testing method.
 - Wireless telephones: There are no final FCC criteria; should adhere to requirements stated above under "Techniques."

7-9.4 References

The following references are applicable to the specific requirements stated here:

- FCC Hearing Aid Compatibility Act
<http://www.fcc.gov/cgb/consumerfacts/hac.html>
- FCC Accessibility of Digital Wireless Phones to Individuals with Hearing Disabilities
<http://www.fcc.gov/cgb/consumerfacts/accessiblewireless.html>
- ICC/ANSI A117.1-1998 Standard: Accessible and Usable Buildings and Facilities
<http://webstore.ansi.org/ansidocstore/product.asp?sku=ICC%2FANSI+A117%2E1%2D1998>
- ICC/ANSI/IEEE C63.19-2001 Standard: Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids
<http://webstore.ansi.org/ansidocstore/product.asp?sku=C63%2E19%2D2001>
- ANSI IEC 60118-13 Ed. 1.0 b:1997 Standard: Hearing aids - Part 13: Electromagnetic compatibility (EMC)
<http://webstore.ansi.org/ansidocstore/product.asp?sku=IEC+60118%2D13+Ed%2E+1%2E0+b%3A1997>
Covers all relevant EMC phenomena for hearing aids. Specifies measurement methods and acceptance levels for hearing aid immunity to high frequency electromagnetic fields originating from digital telephone systems as specified in IEC 61000-4-3.

- TIA-504-A, Telecommunications-Telephone Terminal Equipment-Magnetic Field and Acoustic Gain Requirements for Headset Telephones Intended for Use by the Hard of Hearing (R2003)
http://www.tiaonline.org/standards/search_results2.cfm?document_no=TIA%2D504%2DA
- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- OSHA regulations
http://www.osha-slc.gov/OshDoc/Interp_data/119910401A.html

7-10 Minimized Interference

Interference with hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) must be reduced to the lowest possible level that allows a user of hearing technologies to use the telecommunications product (§1194.23, Provision i).

7-10.1 Rationale

Users of hearing technologies must not be prevented from using telecommunications products due to interference. The term “hearing technologies” includes hearing aids, cochlear implants, assistive listening devices, and other types of hearing technologies. These technologies pick up radio frequency signals that are radiated from digital wireless/cellular telephones’ antennas using energy pulses that the hearing instrument circuitry picks up and demodulates as audible interference. In addition, magnetic fields generated by handset components, such as battery leads, may cause noise when hearing technology wearers are using the telecoil to couple inductively to the handset. Many hearing technology users, therefore, hear significant buzzing or pounding sounds that may completely mask the speech of a call and make the wireless digital telephone unusable for voice conversations. Some hearing technologies are more immune to interference than others. Some digital wireless/cellular telecommunications transmission technologies cause more annoying interference than others. For example, code division multiple access (CDMA)-based technologies generally cause less bothersome interference in hearing aids than global system for mobile communications (GSM) technologies.

“Compatibility” ideally means that the hearing instrument and telecommunications product function well as a system. That may require meeting both the magnetic coupling requirement (section 7-9) and this minimized interference requirement. Previously in the 1980s, when the Federal Communications Commission (FCC) referred to hearing-aid compatibility (HAC), it meant only magnetic coupling (Provision h, section 7-9). That provision was written at a time when wireless/cellular telephones were analog and most of those telephones did not cause interference.

However, in keeping with the new challenges posed by digital technologies, the FCC recently redefined HAC for digital wireless/cellular telephones to mean a combination of magnetic coupling and minimized interference. In August 2003, the Federal Communications Commission (FCC) issued a ruling directing wireless/cellular telephone manufacturers and wireless/cellular service providers to take steps to reduce the amount of interference caused by wireless/cellular telephone handsets. The FCC's Report and Order (<http://ftp.fcc.gov/cgb/consumerfacts/accessiblewireless.htm>) is intended to ensure that redesigned compatible cellular telephone handsets will be widely available and hearing-aid immunity will continue to improve. Specifically, it requires a percentage of wireless/cellular digital telephones with reduced interference within 3 years.

The hearing technology industry and cellular telephone industry recently completed a standard, ANSI C63.19-2001, which provides specific tests and target parameters for hearing aids and wireless/cellular telephones that should be used to determine compliance with this requirement.

This requirement applies to all products that provide a voice telecommunications function.

7-10.2 Techniques

All products that provide telephone functions (i.e., 2-way voice communication) must minimize interference with hearing technologies to the lowest possible level that allows a user of hearing technologies to use telecommunications products, while at the same time maintaining desired product performance.

The following practices may help manufacturers and developers to do so:

- Consider applying methodologies outlined in ANSI C63.19-2001 to inform the product design process. ANSI C63.19-2001 provides procedures to measure electromagnetic emissions produced by wireless/cellular handsets. The ANSI standard provides two summary test results, one for radio frequency emissions that create a buzzing noise in hearing aids primarily when they are in the microphone (default) setting, and one for compatibility with the hearing aid's telecoil or similar assistive listening device component. For each of these results, there are four levels defined, with category 4 being the best (i.e., lowest emission) category. The FCC has set a minimum of category 3 for telephones that are to be considered and labeled as compatible with hearing aids (rule goes into effect in 2005). Note that CDMA-based technologies generally cause less bothersome interference in hearing aids than do GSM technologies.
- Consider applying information learned from the ICDR "Summit on interference to hearing technologies" (see "References"). In light of the FCC ruling mentioned above, the Federal Interagency Committee on Disability Research (ICDR) held this timely summit in September 2003. Participants included representatives from the digital wireless telephone and hearing aid industries, disability organizations, research centers, and federal agencies. Presentations were made on laws that address

hearing-aid compatibility, new technological developments, telephone designs that reduce interference, and results of laboratory and consumer testing.

- Consider using various techniques that help reduce interference emissions from digital wireless (i.e., cellular) telephones, including the following:
 - Positioning the antenna away from the ear area.
 - Reducing power.
 - Modifying the antenna to reduce radio frequency currents in the area near the user's ear.
 - Using a clamshell design that moves the antenna away and partially shields it.
 - Providing the user with ability to turn off backlighting.
 - Inserting shielding in the wireless/cellular digital telephone.
 - Replacing an omnidirectional antenna with a directional antenna.

7-10.3 Testing

- a. Conduct an inspection of the telecommunication product to determine if it provides telephone functions (i.e., 2-way voice communications).
- b. Use the ANSI/IEEE C63.19 standard as a guide for compatibility between wireless telephones and hearing technologies. It does not provide an absolute measure of interference across hearing-aid types. It may be useful to provide relative measures of interference among telephones with widely differing levels of interference. Handset, headset, and hearing-aid companies should provide ratings for their products against this standard.

7-10.4 References

The following references apply to the specific requirements stated in this section:

- FCC Hearing Aid Compatibility Act
<http://www.fcc.gov/cgb/consumerfacts/hac.html>
- FCC Accessibility of Digital Wireless Phones to Individuals with Hearing Disabilities
<http://www.fcc.gov/cgb/consumerfacts/accessiblewireless.html>
- ICC/ANSI/IEEE C63.19-2001 Standard: Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids
<http://webstore.ansi.org/ansidocstore/product.asp?sku=C63%2E19%2D2001>
- TIA-504-A, Telecommunications-Telephone Terminal Equipment-Magnetic Field and Acoustic Gain Requirements for Headset Telephones Intended for Use by the Hard of Hearing (R2003)
http://www.tiaonline.org/standards/search_results2.cfm?document_no=TIA%2D504%2DA

- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default##telecomm>
- OSHA regulations
http://www.osha-slc.gov/OshDoc/Interp_data/119910401A.html
- Federal Interagency Committee on Disability Research (ICDR) Summit (September 2003): “Summit on Interference to Hearing Technologies.”
<http://www.icdr.us/>
Participants included representatives from the digital wireless telephone and hearing technologies industries, disability organizations, research centers, and Federal agencies, such as the FCC and the Food and Drug Administration (FDA). Presentations were made on laws that address hearing aid compatibility, new technological developments, and telephone designs that reduce interference, and the results of laboratory and consumer testing.

7-11 Transmission/Conducting Information

Products that transmit or conduct information or communication must pass through cross-manufacturer, non-proprietary, industry-standard codes, translation protocols, formats, or other information necessary to provide the information or communication in a usable format. Technologies that use encoding, signal compression, format transformation, or similar techniques must not remove information needed for access or must restore it upon delivery (§1194.23, Provision j).

7-11.1 Rationale

Services such as closed captioning and video description provide access to multimedia transmission for people with disabilities (see Chapter 8, Video and Multimedia). The information communicated through these services includes text, audio, and coded information for delivery and/or display of the information. This telecommunications product provision was created largely in response to problems with transmission of closed captioning information being distorted or removed — due to transmission problems — but it also applies to TTY tones (which are covered specifically in other telecommunications product provisions as well).

Historical sources of problems have been stripping and garbling or loss of synchronization of caption data due to compression, duplication, transmission, frame loss or removal, re-encoding, or digital rights management methods. Some systems completely remove captioning accidentally during transmission or compression simply because the designers are not aware that it exists in the synchronization, periods of the signal. On other systems, compression techniques may corrupt the captions, because the compression techniques were designed without knowledge of or consideration for captions. Still other systems, to save bandwidth, do not deliver secondary or auxiliary channels that carry accessibility information.

Thus, the captioning or video description information is blocked, and the users who rely on these services for accessibility are denied their benefit.

Another example of TTY problems with digital service is in wireless (e.g., cellular) communications. In some systems, frame errors occur at levels that are tolerated well for voice communications, but are very disruptive to TTY communication. Other problems have arisen from some noise-cancellation algorithms in codecs and from some implementations of digital signaling and audio signal compression schemes. However, the wireless industry, under order from the FCC to make services compatible with TTYs, has now completed its work (in collaboration with handset and TTY manufacturers). Wireless carriers have reported to the FCC that their services carry TTY signals intact.

This provision applies to products and systems that transmit or conduct information or communications — regardless of format — that may contain coding necessary for accessibility (e.g., captioning information or video description in video transmissions). It would also apply to any other devices that transmit information or encode information for transmission (and decode it after). This provision also clearly applies to TTY signals passed through office *telecommunications* products and services (e.g., routers). TTYs were designed to function as modems over standard telephone lines. Some technological changes in telecommunications systems have caused problems for the TTY signals. This provision is written broadly so as to cover future telecommunications services that may affect accessibility. Captioning, video description, and TTY products that meet the criterion of “cross-manufacturer, non-proprietary, industry-standard” should be supported.

Telecommunications is defined as “the transmission, between or among points specified by the user, of information of the user’s choosing, without change in the form or content of the information as sent and received.”

This definition is used extensively in law and regulations affecting telecommunications products. Therefore, there exists substantial legislative, regulatory, and case history defining its terms and scope.

7-11.2 Techniques

Products that transmit or conduct information or communication must pass through cross-manufacturer, non-proprietary, industry-standard codes, translation protocols, formats or other information necessary to provide the information or communication in a usable format.

Products and technologies that use encoding, signal compression, format transformation, or similar techniques must not remove information needed for access or should restore it upon delivery. Some examples of such codes or protocols include the following:

- NTSC Video with closed captions.
- NTSC Video with descriptive audio in the alternate audio channel.
- Digital Video with closed captions.
- Digital Video with secondary audio programs.

- Traditional telephone data stream between two users of TTY equipment.
- Voice over IP data stream between two users of TTY emulating software.

7-11.3 Testing

- a. Inspect the product or technology for products that transmit or conduct information. Inventory each product or service in the transmission path.
- b. Depending on the product type, determine what accessibility information is encoded in the production, signal, or communication and understand the intended delivery approach based on planned system usage.
 - For systems that support telephone functions (i.e., 2-way voice communication), the accessibility information will usually be a TTY signal of some kind (which varies based on device).
 - For video and multimedia productions, the accessibility will be closed captioning and secondary audio program content (or audio description) (see chapter 8).
- c. Examine each product or service in the transmission path to ensure that none of the products or services alter, corrupt, delete, or make unusable any included accessibility information transmitted with the production, signal, or communication along the way to the end user.
 - For systems that support telephone functions, insure that cross-manufacturer, non-proprietary, industry-standard codes for TTY are passed through in a usable format.
 - For video and multimedia productions, insure that cross-manufacturer, non-proprietary, industry-standard codes for captioning and audio description are passed through in a usable format.

7-11.4 References

The following references are applicable to the specific requirements stated here:

- Gallaudet University: “Tools for field testing TTYs with wireless phones”
<http://tap.gallaudet.edu/TTYtools/>
- EIA-708 Specification for Digital Television Closed Captioning
http://www.tiaonline.org/standards/search_results2.cfm?document_no=EIA%2D708%2DB
- FCC: DTV Regulations
<http://www.fcc.gov/dtv/>
- FCC Accessibility of Digital Wireless Phones to Individuals with Hearing Disabilities
<http://www.fcc.gov/cgb/consumerfacts/accessiblewireless.html>

- ICC/ANSI/IEEE C63.19-2001 Standard: Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids
<http://webstore.ansi.org/ansidocstore/product.asp?sku=C63%2E19%2D2001>
- TIA-504-A, Telecommunications-Telephone Terminal Equipment-Magnetic Field and Acoustic Gain Requirements for Headset Telephones Intended for Use by the Hard of Hearing (R2003)
http://www.tiaonline.org/standards/search_results2.cfm?document_no=TIA%2D504%2DA
- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- Trace Research and Development Center, "Access to Voice over Internet Protocol (VoIP)"
<http://www.tracecenter.org/docs/2003-NMRC-VoIP-Access/>
- Trace Research and Development Center, "Voice over Internet Protocol (VoIP) Services Forum", December 1, 2003, Expanded Opening Comments of Gregg C Vanderheiden Ph.D.
<http://www.tracecenter.org/docs/2003-12-1-FCC-VoIP-Forum/index.htm>
- OSHA regulations
http://www.osha-slc.gov/OshDoc/Interp_data/119910401A.html
- Federal Interagency Committee on Disability Research (ICDR) Summit (September 2003): "Summit on Interference to Hearing Technologies."
<http://www.icdr.us/>
Participants included representatives from the digital wireless telephone and hearing technologies industries, disability organizations, research centers, and Federal agencies, such as the FCC and the Food and Drug Administration (FDA). Presentations were made on laws that address hearing aid compatibility, new technological developments, and telephone designs that reduce interference, and the results of laboratory and consumer testing.

7-12 Controls and Keys

Products that have mechanically operated controls or keys must comply with the following four requirements (§1194.23, Provision j): (1) Controls and keys must be tactilely discernible without activating the controls or keys. (2) Controls and keys must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys must be 5 lbs. (22.2 N) maximum. (3) If key repeat is supported, the delay before repeat must be adjustable to at least 2 seconds. Key repeat rate must be adjustable to 2 seconds per character. (4) The status of all locking or toggle controls or keys must be visually discernible and must be discernible either through touch or sound.

7-12.1 Rationale

These provisions apply to user-operable controls, which are components of a product that are operated by physical contact. Typically, the control panel or user interface, and their major components, buttons, keys, and knobs are the primary items of concern. However, mechanically operated controls such as latches are also covered, as long as they require contact for “normal operation”. Examples of normal operation would include selecting features and pressing keys. Operable controls required for maintenance, service, repair, installation, and configuration or occasional monitoring are not covered by this provision (e.g., an RJ-11 plug that may be connected into a jack only one time). Some of the reasons behind the four provisions in this requirement are given below:

- Requirement (1) requires that individual keys be locatable and distinguishable from the product surface and adjacent keys by touch. This provision only applies to products that have mechanically operated controls or keys, such as standard telephone keypads and computer keyboards. It is not intended to apply to touchscreens. Touchscreens and other contact-sensitive controls are not specifically prohibited by any of the telecommunications product provisions. However, since all devices need to meet the Functional Performance Criteria (see section 4-2.1), products that incorporate touchscreens or contact-sensitive controls can meet these criteria only if an alternative way of operating them using tactilely discernable controls is provided. At this time, some telecommunications products with touchscreens and other contact-sensitive controls do not conform with this provision. For example, there are PDAs with telephone functionality and touchscreens, as well as desk telephones with touchscreen-enhanced features that cannot be operated via tactile controls.
- Requirement (2) requires that controls and keys must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist. Individuals with tremor, cerebral palsy, or other disabilities may have difficulty operating systems that require fine motor control, a steady hand, or require that two hands to be used simultaneously for operation. Individuals with high spinal-cord injuries, arthritis, and other conditions may have difficulty operating controls that require significant strength. The requirement’s force limit (5 pounds) is based on section 4.27.4 of the ADA Accessibility Guidelines. This provision is also consistent with the Telecommunications Act Accessibility Guidelines.
- Requirement (3) requires that if key repeat is supported, the delay before repeat must be adjustable to at least 2 seconds. Key repeat rate must be adjustable to 2 seconds per character. This requirement addresses a challenge encountered by some people without fine motor coordination. Sometimes they accidentally don’t release a key fast enough and get several (auto-repeated) characters when they only intended to type one (because the key repeat was faster than they can move). This could potentially result in the same character displaying several times on the screen. It could also result in the same function

repeating (e.g., causing the telephone volume to get too high). The “key repeat” requirement applies only to controls that have a “key repeat” function. Most telephone products would not have a repeat function on the dial pad. However, many telephones have key repeat functionality on menu navigation arrows, backspaces, or volume controls. Telephony functions on products with a keyboard may also have other repeat functions.

- Requirement (4) requires that the status of all locking or toggle controls or keys (e.g., “caps lock,” “scroll lock,” etc.) must be visually discernible, and discernible either through touch or sound. For example, adding audio patterns, such as ascending and descending pitch tones that indicate when a control is turned on or off, would alleviate the problem of a person who is blind inadvertently pressing the locking or toggle controls. Also, buttons that remain depressed when activated and switches with distinct positions may meet this provision.

7-12.2 Techniques

7-12.2.1 Ensure That Users Can Locate Keys By Touch Without Activating Them

Ensure that individual keys are tactilely discernable without activating the controls or keys.

“Tactilely discernable” means that the keys are locatable and distinguishable from the product surface and adjacent keys by touch through use of various shapes, spacing, or tactile markings. The normal desktop computer keyboard, for example, would meet this provision because the tactile marks on the “j” and “f” keys permit a user to locate all other keys tactilely from these landmarks and the edges of the keyboard. In addition, the physical spacing of the function, “num pad” and cursor keys make them easy to locate by touch. Many telephones also have a raised dot on the number 5 button, enabling them to orient their fingers around the 12 keys. Because touch is necessary to discern tactile features, this provision requires keyboards to allow exploration by touch that will not automatically activate a function based on mere contact. Fortunately, most keyboards require some pressure on individual keys in order to enable a keystroke. Therefore, “capacitance” keyboards would not meet this provision because they react as soon as they are touched and have no raised marks or actual keys. They may not react at all when touched by a person with a prosthesis. A “membrane” keypad with keys that must be pressed can be made tactilely discernible by separating keys with raised ridges so that individual keys can be distinguished by touch. At this time, some telecommunications products with touchscreens and other contact-sensitive controls do not conform with this provision. For example, there are PDAs with telephone functionality and touchscreens, as well as desk telephones with touchscreen-enhanced features that cannot be operated via tactile controls. Every attempt should be made to acquire technology that can comply with this requirement where possible and

practical. Consider the following recommendations that support this requirement:

- Consider placing tactile marks on top of the keys, not beside them, and raising the marks a minimum of 0.5 mm.
- On telephone keypads, the “5” key could have a tactile marker, such as a “nib” or “bar,” on the top surface.
- On QWERTY keyboards, the “F” and “J” keys could have a raised bar on them.
- Recessed keys or keys with concave tops can be an aid to users operating them with a mouth stick or head stick. Raised keys aid users with visual disabilities to locate keys.
- To help people with fine-motor-control problems, a key guard or overlay option could be provided when practical.
- Making other important keys tactilely distinct (shape, size, spacing, tactile markings) can make them easier to remember and find.

7-12.2.2 **Ensure That All Controls and Keys Are Easy to Use**

Ensure that all controls and keys can be activated with one hand using a maximum force of 5 lbs (22.2 N) and do not require tight grasping, pinching, or twisting of the wrist.

Adhere to the following recommendations that support this requirement:

- Just as simultaneous two-handed operation is prohibited, operations that require the use of more than one finger at a time and simultaneous operations of all types should be avoided and are prohibited by section 7-6, which prohibits simultaneous actions and applies to all products.
- Using controls and latches which require light pressure to operate, such as push buttons, up/down control buttons (instead of side-to-side control buttons), concave rocker switches, or sliding controls would make it easier for users with various types of physical disabilities.
- Avoid using controls that must be held down for more than 5 seconds, if there is no other way to achieve the function. The provision specifically states that keys and controls must not require twisting. This does not mean, however, that rotary knobs cannot be used. If the knobs can be operated within the 22.2 N force limit and without requiring the user to twist, pinch, or tightly grasp, then they would conform. Many that have a reasonable surface coefficient of friction and which turn without great effort would meet the requirements of this provision. Keep in mind that sufficient room should be provided around the knobs if they are to be operated in this fashion (e.g., with the side of the hand).

7-12.2.3 **Key Repeat Must Be Adjustable**

If key repeat is supported, the delay before repeat must be adjustable to a rate of at least 2 seconds per character.

When key repeat is supported, adhere to the following recommendations that support this requirement:

- Provide an option to disable the key repeat function.
- Provide an option to set a key acceptance rate (how long the key must be depressed before being recognized).
- If the intention of repeating a key is to reach a target goal, provide an alternate way for the user to enter that target. For example, if a person were to increase volume from 1 to 20 by depressing a key 20 times, it would be easier to simply (or alternatively) press the numbers 2 and 0 to enter 20.

7-12.2.4 **Status of Locking/Toggle Controls or Keys Must Be Discernible**

Make sure that the status of all locking or toggle controls or keys is visually discernible, and discernible either through touch or sound.

Adhere to the following recommendations that support this requirement:

- Use two different types of feedback, such as a combination of tactile, audible, and visual feedback to help make products easier for people with sensory disabilities to use.
- When using audio feedback, consider associating intuitively meaningful sounds with actions. For example, try using increasingly high-pitched sounds with increasing amplitude. Use cascading sounds with rotary or slide controls with the pitch associated with the change in control.
- Provide an audio indication of a toggle status, instead of a continuous signal, sufficiently long enough to alert the user to the position of the toggle switch.

7-12.3 **Testing**

- a. *For Requirement (1):* Ensure that all mechanically operated controls and keys are tactilely discernable, perform the following tests:
 - Check for tactile marks on top of the keys (not beside them) and raised marks that have a minimum height of 0.5 mm.
 - On telephone keypads, check for a tactile marker, such as a “nib” or “bar”, on the top surface of the “5” key.
 - On QWERTY keyboards, check for a raised bar on the “F” and “J” keys.
 - Check for recessed keys or keys with concave tops, which aid visually and mobility-impaired users in locating keys.
 - Check for key guards or overlays that help people with fine motor control problems.
 - Check for other distinctions (shape, size, spacing, tactile markings) that make keys easier to remember and tactilely discernable.

- b. *For Requirement (2):* Ensure that each control and key is operable with one hand and must not require tight grasping, pinching, or twisting of the wrist, perform the following tests:
- For each control or key, note if any of the following conditions exist: two hands are required to operate the control or key, a tight grasp is needed, a pinching or twisting of the wrist is needed to operate the control.
 - For push controls, measure the force needed to activate the control. The force required to activate controls and keys must not be more than 5 lbs. (22.2 N). The effects of knob diameter, toggle configuration, surface textures, surrounding surfaces, etc., will likely influence this measurement. Include measurements for push controls only, as it may be difficult to measure the force required by non-push-button controls such as pull-type, rotary, slide, thumb wheels, and toggles.
- c. *For Requirement (3):* Ensure appropriate key repeat rate and delay, perform the following tests:
- Hold a key down for 2 seconds or more and observe if key repeat occurs.
 - Hold a key down for less than 2 seconds and note whether the key repeat occurred — it should not have.
 - Inspect the user manual and reference manual to determine if key repeat delay is adjustable. If so, note the allowed range of times for repeat delay.
- d. *For Requirement (3):* Ensure that key repeat rate can be adjusted, inspect the user manual and reference manual to determine if key repeat rate is adjustable. If so, note the allowed range of repeat rates.
- e. *For Requirement (4):* Identify all locking or toggle controls or keys. Note that all locking or toggle controls or keys (which excludes maintenance and setup features) are included in the complete set of elements covered by chapters 5 through 10. For each locking or toggle control or key, perform the following tests:
- Check that the status of the control or key is visually discernible.
 - Check for either an audible or tactile indicator for the status of the control or key.

7-12.4 References

The following references are applicable to the specific requirements stated here:

- Tiresias – International Information on Visual Disability, guidelines for tactile identifiers on keys
<http://www.tiresias.org/guidelines/keys.htm>
- Enable Tech: Tools to Consider – Keyboards
<http://www.enabletech.ie/Tools2.html>

- Guide to the Section 508 Standards for Electronic and Information Technology, Telecommunications Products (1194.23), Updated: June 21, 2001
<http://www.access-board.gov/sec508/guide/1194.23.htm>
- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- Section 4.27.4 of the ADA Accessibility Guidelines (ADAAG), codified as the ADA Standards for Accessible Design as part of the Department of Justice's regulation implementing title III of the ADA at 28 C.F.R. pt. 36, Appendix A Telecommunications Act Accessibility Guidelines
<http://www.access-board.gov/adaag/html/adaag.htm#4.27>

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Appendix 7-A

Telecommunications Products Accessibility Checklist

Use this as a tool for high-level guidance in determining if a telecommunications product is compliant or accessible.

| | Requirement Number and Summary | Yes, No, or N/A | Comments |
|-----|---|-----------------|----------|
| 7-2 | TTY Connections and Microphones. Telecommunications products or systems that provide telephone functions (i.e., 2-way voice communication) and which do not themselves provide TTY functionality must provide a standard non-acoustic connection point for TTYs. Microphones must be capable of being turned on and off to allow the user to intermix speech with TTY use (§1194.23, Provision a). | | |
| 7-3 | TTY Signal Protocols. Telecommunications products that provide telephone functions (i.e., 2-way voice communication) must support all commonly used cross-manufacturer nonproprietary standard TTY signal protocols (§1194.23, Provision b). | | |
| 7-4 | Voice Mail, Auto-Attendant, and Interactive Voice Response (IVR) Systems. Voice mail, auto-attendant, and interactive voice response telecommunications systems must be usable by TTY users with their TTYs. (§1194.23, Provision c). | | |
| 7-5 | Time Interval Alerts for IVR Systems. Voice mail, messaging, auto-attendant, and interactive voice response telecommunications systems that require a response from a user within a time interval must give an alert when the time interval is about to run out and must provide sufficient time for the user to indicate more time is required (§1194.23, Provision d). | | |
| 7-6 | Caller ID and Similar Functions. Where provided, Caller ID and other telephone function information that is available to other users of the same system must be provided to TTY users of that system as well. Such users may not be able to see the display of that information (§1194.23, Provision e). | | |
| 7-7 | Volume Control. For transmitted voice signals, telecommunications products that provide telephone functions must provide a gain adjustable up to a minimum of 20 dB. For incremental volume control, at least one intermediate step of 12 dB of gain must be provided (§1194.23, Provision f). | | |
| 7-8 | Automatic Volume Reset. If a telecommunications product that provides telephone functions allows a user to adjust the receive volume, a function must be provided to automatically reset the volume to the default level after every use (§1194.23, Provision g). | | |

| | Requirement Number and Summary | Yes, No, or N/A | Comments |
|------|---|-----------------|----------|
| 7-9 | Hearing-Aid Compatibility. Where a telecommunications product delivers output by an audio transducer that is normally held up to the ear, a means for effective magnetic wireless coupling to hearing technologies must be provided (§1194.23, Provision h). | | |
| 7-10 | Minimized Interference. Interference with hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) must be reduced to the lowest possible level that allows a user of hearing technologies to use the telecommunications product (§1194.23, Provision i). | | |
| 7-11 | Transmission/Conducting Information. Products that transmit or conduct information or communication must pass through cross-manufacturer, nonproprietary, industry-standard codes, translation protocols, formats, or other information necessary to provide the information or communication in a usable format. Technologies that use encoding, signal compression, format transformation, or similar techniques must not remove information needed for access or must restore it upon delivery (§1194.23, Provision j). | | |
| 7-12 | Controls and Keys. Products which have mechanically operated controls or keys, must comply with the following four requirements (§1194.23, Provision j): (1) Controls and keys must be tactilely discernible without activating the controls or keys. (2) Controls and keys must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys must be 5 lbs. (22.2 N) maximum. (3) If key repeat is supported, the delay before repeat must be adjustable to at least 2 seconds. Key repeat rate must be adjustable to 2 seconds per character. (4) The status of all locking or toggle controls or keys must be visually discernible, and discernible either through touch or sound. | | |

8 Video and Multimedia Products

8-1 Overview

8-1.1 Contents

This chapter contains the specific electronic and information technology (EIT) performance requirements related to the following subpart of Section 508:

EIT Technical Standard 1194.24, Video and Multimedia Products, Provisions (a) thru (e).

8-1.2 Summary

8-1.2.1 Technology

The requirements in this chapter cover the following:

- All **mission-critical video and multimedia products and productions** used by the Postal Service as defined by the Access Board, regardless of size or whether purchased or developed internally. *Multimedia* is defined by the Access Board as including “more than one medium or sensory mode like a VHS or streaming Web video since it includes both audio and visual elements.” The multimedia must also be both of the following:
 - A *production*, as it must be intended for broadcast, rebroadcast, or multiple viewings.
 - Related to the mission of the organization (i.e., it must be considered *mission-critical*).
- All **associated data, information, training material, and documents** related to those mission-critical video and multimedia productions.
- **Multimedia elements that are part of a live presentation.** For example, a video presented during a graphics slideshow would need to comply with the specific requirements in this chapter. The presentation equipment often must comply with either Chapter 9, Self-Contained, Closed Products, or Chapter 10, Desktop and Portable Computers.
- **Elements that use only one sensory mode** (e.g., a graphical animation that does not contain any audio, or an audio file that does not contain or synchronize with any visual content). Such elements often qualify as non-text elements. Based on the mode of delivery (e.g., Web,

software, self-contained, etc.), specific requirements in other chapters of this handbook may also apply. For example, an animated element found on a Web page that does not include any audio must comply with the “Animation” requirement in Chapter 6, Web-Based Information and Applications.

Note: You may need to synchronize general and specific requirements in this chapter with requirements in other chapters in this handbook. For example, video and multimedia accessed via internal or external Postal Service Web sites must also comply with the requirements stated in Chapter 6, Web-Based Information and Applications. Video or multimedia products that are embedded in software applications or that run on self-contained platforms or in kiosks may require synchronization with other chapters.

8-1.2.2 **Audience**

This chapter applies to all personnel who purchase or develop video or multimedia products for the Postal Service (i.e., Postal Service employees, suppliers, contractors, and business partners). Video or multimedia products include information technology solutions of all scope and magnitude, consisting of simple or complex purchases or development that span other technical areas, and all associated data, information, training material, and documents.

8-1.3 **Structure and Use**

Each part of this chapter describes the specific requirements that support one or more provisions in the technical standards for video and multimedia products. The technical standards of Section 508 were written primarily from a technology perspective. The Postal Service has detailed these technical standards to aid Postal Service employees, suppliers, contractors and business partners with understanding Postal compliance requirements from the perspective of designing for accessibility. Each specific requirement includes a Rationale, Techniques, Testing Methods, and References as shown below in section 8-2.

8-1, Overview

8-2, Analog and Digital Video Caption Receivers, Decoders, and Displays (Provision §1194.24a)

- Rationale
- Techniques (and Exhibits)
- Testing
- References

8-3, Television Tuners and Secondary Audio Playback Circuitry (Provision §1194.24b)

8-4, Open or Closed Captioning of Video and Multimedia Productions (Provision §1194.24c)

8-5, Audio Description of Video and Multimedia Productions (Provision §1194.24d)

8-6, User-Selectable Captions or Audio Descriptions (Provision §1194.24e)

Appendix 8-A, Postal Service Video and Multimedia Accessibility Checklist

Appendix 8-B, Summary of Video and Multimedia Delivery Methods and Requirements

8-1.4 **Introduction to Video and Multimedia Accessibility**

While looking at video and multimedia barriers, it is helpful to understand the challenges that people with various disabilities face in accessing and viewing videos and other multimedia. The need for a solution to these challenges resulted in the development of specific video and multimedia accessibility standards in Section 508. Here is a summary of those challenges:

- People with hearing disabilities are typically faced with challenges such as:
 - Lack of closed captioning support in broadcast or transmission methods.
 - Lack of closed captioning support in display technologies such as TVs, monitors, and media players.
 - Lack of closed or open captioning as an included feature of a video or multimedia production.
 - Lack of ability to turn closed captioning on and off, using both hardware and software controls, or using functions built into video or multimedia productions.
- People with visual disabilities are typically faced with challenges such as:
 - Lack of support for secondary audio program (SAP) or stereo audio in broadcast or transmission methods.
 - Lack of support for secondary audio program (SAP) or stereo audio playback in display technologies such as TVs, monitors, and media players.
 - Lack of audio descriptions as an included feature (on a SAP) of a video or multimedia production.
 - Lack of ability to turn SAP content on and off, using both hardware and software controls, or using functions built into video or multimedia productions.

While making video and multimedia products accessible presents many challenges, the greatest barrier to compliance with Section 508 is lack of knowledge. Video and multimedia products can sometimes be made accessible with minimal difficulty and expense. In addition, buying or building accessible video or multimedia products can benefit the population at large, not just people with disabilities.

8-1.5 General Requirements

- Implementation of specific requirements will require **research** on the current accessibility features of the target platform, operating system, or transmission/broadcast method.
- All video and multimedia productions should be designed with the **evolving open standards for accessibility** that support cross-platform use (i.e., use of SMIL standards that are supported by most digital media players, etc.).
- Sections 8-2, 8-3, and 8-6 provide detailed requirements for **hardware and software technologies** used to produce, transmit, and display video and multimedia.
- Sections 8-4, 8-5, and 8-6 provide detailed requirements for **authoring and encoding** captioning and audio descriptions in video or multimedia content, **documentation, or applications**. Captioning and audio description, or an appropriate alternate format or alternate access method are required for all productions defined as “mission-critical” by the agency. This includes, but is not limited to, any pre-produced video or multimedia productions used in training, product or service demos, health or safety videos, or advertising produced for wide distribution on Postal or external television networks or on the Internet.
- Manual inspection or tool-based testing methods may not be available for the specific requirements described in this chapter. In lieu of standard testing methods, Postal Service employees and representatives must ensure compliance with the techniques stated in the specific requirements, as applicable. Automated testing tools and methods may be available over time, but automated testing must be accompanied by manual testing. For example, a developer can use a development tool to test for valid syntax (e.g., using an accessibility checker within a multimedia authoring program), but a manual inspection must still be done to validate semantics and proper rendering. In other words, the meaningfulness of the captions or audio descriptions must also be considered for the end user who may have a physical disability and who may use assistive technology.
- In many cases, **raw videotaped footage** does not have to be captioned or audio described. For example, raw videotaped footage used to document a safety violation could be considered a video “in support of the Postal Service’s mission.” If the footage is used in a *production*, however, such as a Web-based presentation or training video, it *does* have to be captioned or audio described.

8-1.6 **Alternate Formats, Alternate Access Methods, and Reasonable Accommodation**

When compliance cannot be achieved using the techniques described in this chapter, individuals with disabilities must be provided equivalent access to video and multimedia content through an alternate format or access method. An alternate format or access method must be equivalent in content and functionality to the primary video or multimedia source, and it must be updated concurrently with the primary source. Alternate formats and alternate access methods must be made available at no additional charge.

Electronic alternate formats should be considered as the first preference for comparable video or multimedia content. These electronic alternate formats must be made available to participants in a timely manner, distributed either via the Internet or the Postal Service Intranet.

- For Postal Service sites on the Internet, electronic alternate formats are restricted to HTML, plain text, or rich text format (RTF) files.
- For the Postal Service intranet, the electronic alternate format may also be one of the native formats used by the Postal Service for its standard suite of office products (e.g., Microsoft Word, Excel, and PowerPoint).

When live events organized or sponsored by the Postal Service are open to the general public, any included video and multimedia productions or live presentations must include captions. Real-time captions must be integrated and synchronized with the video stream where TV or satellite broadcasts are included. (Even so, interpreting services may still be required.) Live presentations that do not involve broadcast technologies or multimedia productions may be captioned using a separate monitor, such as a steno-captioning service. Captions serve as a text equivalent for the audio portions of multimedia productions. In addition, multimedia productions require audio descriptions for any visual content that is necessary for understanding. (Currently, audio descriptions are most often provided as part of a second version of the production or are included on the secondary audio program track.)

When live events are not open to the general public — or when other accommodation methods are required or preferred — captions or audio descriptions may not have to be provided. Instead, reasonable accommodations can be offered to participants with disabilities (see Handbook EL-307, *Reasonable Accommodation*, for more information). Reasonable accommodations for live presentations of video and multimedia often include, but are not limited to, American Sign Language (ASL) interpreters, steno-captioning services, remote audio listening systems, and the like. Note that, in some cases, (i.e., large venues), ASL interpreters should be displayed on screen along with the primary visual presentation, so that they can be seen by all who need them.

Only as a last resort should other alternate formats or alternate access methods be considered as comparable access.

- Other alternate formats may include, but are not limited to, Braille, large print, cassette recordings, and recorded audio.
- Other alternate access methods may include, but are not limited to, voice, fax, relay service, and TTY.

8-2 Analog and Digital Video Caption Receivers, Decoders, and Displays

All analog television displays 13 inches and larger, and computer equipment that includes analog television receiver or display circuitry, must be equipped with caption decoder circuitry that appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals. As soon as practicable, but not later than July 1, 2002, widescreen digital television (DTV) displays measuring at least 7.8 inches vertically, DTV sets with conventional displays measuring at least 13 inches vertically, and stand-alone DTV tuners, whether or not they are marketed with display screens, and computer equipment that includes DTV receiver or display circuitry, must be equipped with caption decoder circuitry that appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals (Section 508, Provision §1194.24a).

8-2.1 Rationale

This requirement addresses the techniques used to ensure that all applicable Postal Service video receivers and displays are capable of displaying closed captioning in a variety of contexts. This requirement *does not* address the techniques used to author or encode the open or closed captioning in the video or multimedia itself (see section 8-4).

Like subtitles, captions display spoken dialogue found in various video and multimedia products as visual text on television displays or computer monitors in a variety of Postal Service settings. Unlike subtitles, captions are specifically designed for hearing-impaired and deaf viewers to identify speakers and spoken text and to enable their full participation when viewing video or multimedia products, though they have also proven to be beneficial to a wider range of viewers. Captions are carefully placed so as not to interfere with the visual presentation and often include information regarding on- and



Exhibit 8-2.1: A diagram showing a video signal (including Line 21) being received and interpreted and played back by Caption Decoder Circuitry in a television display or computer monitor.

off-screen sound effects, such as music, major sounds or human sounds such as laughter. Captions are also useful for people who are learning a foreign language, learning how to read, or watching television in a noisy area, as well as for those who understand best by processing visual information.

There are two kinds of captioning that are used to provide such access to the audio portions of video and multimedia products: *open captioning* and *closed captioning* (see the Glossary for definitions).

8-2.2 Techniques

8-2.2.1 Ensure That all Analog Displays Have Caption Decoders

Analog televisions or video displays larger than 13 inches (diagonal) must include caption decoder circuitry that appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals. Decoders are included in all televisions with screens greater than 13 inches built after July 1, 1993. Televisions and monitors without built-in decoders must have an add-on decoder for closed captioning to work. Note that it is often less expensive to purchase a new monitor or television than to add on a decoder.

8-2.2.2 Ensure That all Digital Televisions and Displays Have Caption Decoders

Digital televisions (DTVs) or digital video receivers, tuners, and displays (including those in computer equipment and kiosks) must include caption decoder circuitry that appropriately receives, decodes, and displays captions from broadcast, cable, videotape, and DVD signals. This includes widescreen digital television (DTV) displays measuring at least 7.8 inches vertically, DTV sets with conventional displays measuring at least 13 inches vertically, stand-alone DTV tuners (whether or not they are marketed with display screens), and computer equipment or kiosks that includes DTV receiver or display circuitry.

8-2.2.3 Ensure That all Computer Media Players Support Open Standard Captioning and Audio-Visual Synchronization Methods

Digital media player software used on computer or kiosks for stand-alone or embedded playback must include decoders that decode captions and secondary audio encoded using SMIL markup or another industry-recognized open standard. Recommended by the World Wide Web Consortium (W3C), SMIL is an XML markup designed to be the standard markup language for timing and controlling synchronized media elements (i.e., video, audio tracks and descriptions, captions, and other media). SMIL works for a media player similar to the way that HTML works for a Web browser. Just as HTML markup displays in any browser, the standardized SMIL language fosters interoperability among varieties of media players (see the references below for more information).

8-2.2.4 **Where Practical, Use Real-Time Captioning Systems for Live Events**

Where practical, provide real-time captions for video and multimedia products shown during mission-critical live events that are not Web-based (e.g., major conferences, or distance learning). Real-time captions can be provided using computer-aided real-time captioning (CART) systems that use speech recognition technology to provide simultaneous open captions and immediate text transcripts. For major conferences, as long as the event is not being remotely broadcast, CART can be displayed on a separate screen that will permit larger text and more text on the screen. If such technology-based solutions are not used, provide an appropriate alternate format or alternate access method.

8-2.3 **Testing**

For each technology or service that is developed or purchased, use the following general method to test compliance with the specific requirements in this section:

- Examine the hardware and software equipment used to transmit or display video or multimedia production content, including its associated online or offline documentation. Hardware and software can include equipment such as broadcast or transmission equipment, analog televisions and displays, digital televisions and displays, computer media players, or captioning system technology.
- Check to see if the hardware or software includes caption decoder circuitry or a method for enabling and displaying closed captions in video or multimedia production content that would be played on it.
- If the equipment does support closed captioning enabling, display, and user preferences, attempt to play a closed-captioned video or multimedia production on the equipment. Check to see if closed captions can be enabled, displayed and disabled properly.
- If the equipment does not support closed captioning display, it should either be adapted to do so or not purchased by the Postal Service. If it is purchased, a general exception must be documented and approved by the responsible functional and Supply Management organizations.
- If the equipment is used by the Postal Service, all video or multimedia productions played on the equipment must be open captioned, or an alternate format or alternate access method must be provided.

8-2.4 References

The following references provide additional guidance on the techniques described above, but must not be used in place of the general and specific Postal Service requirements in this chapter. If any of these references conflict with Postal Service requirements, defer to the Postal Service requirements.

- Advanced Television Systems Committee (ATSC) decision that digital television displays will eventually need to be equipped with the capability to provide an alternative to audio playback (e.g., captioning).
<http://www.atsc.org/>
- Apple Computer's "Quicktime and SMIL" Page
<http://www.apple.com/quicktime/authoring/qtsmil.html>
- CPB/WGBH's National Center for Accessible Media: Common DTV Issues
<http://ncam.wgbh.org/dtv/basics/dtvissues.html>
- CPB/WGBH's National Center for Accessible Media: Motion Picture Access Project (MOPIX)
<http://ncam.wgbh.org/mopix/aboutproject.html>
- EIA-708 Specification for Digital Television Closed Captioning
<http://global.ihs.com/>
- FCC: DTV Regulations
<http://www.fcc.gov/dtv/>
- Macromedia Flash Player Home
<http://www.macromedia.com/software/flash/>
- Microsoft Windows Media Home Page
<http://www.microsoft.com/windows/windowsmedia/default.aspx>
- Real Networks SMIL Basics Tutorial
<http://www.realnetworks.com/resources/howto/smil/smilbasics.html>
- The Telecommunications Act of 1996
<http://www.access-board.gov/about/Telecomm Act.htm>
- The Television Decoder Circuitry Act of 1990
<http://www.access-board.gov/sec508/guide/1194.24-decoderact.htm>
- World Wide Web Consortium's list of SMIL Players
<http://www.w3.org/AudioVideo/#SMIL>

8-3 Television Tuners and Secondary Audio Playback Circuitry

Television tuners, including tuner cards for use in computers, must be equipped with secondary audio program playback circuitry (Section 508, Provision §1194.24b).

8-3.1 Rationale

Whereas section 8-2 addresses the reception, decoding, and display elements necessary to display captions, this requirement addresses elements of televisions displays and computer monitors that are required to play secondary audio programs (tracks) that can be encoded in video or multimedia. This requirement does not address the techniques used to author or encode the secondary audio in the video or multimedia itself (see section 8-5).

Most new TVs and computer tuner cards include a feature called Multi-channel Television Sound (MTS). The standard television broadcast contains three audio channels: the right stereo, left stereo, and secondary audio program (SAP). MTS includes the secondary audio program (SAP) playback circuitry, so that it can receive and display all three. The SAP channel can contain alternative audio such as the soundtrack in another language, audio descriptions, or additional information about the program. Only stereo (not mono) televisions can receive the third SAP channel.

During a stereo television broadcast, two audio signals are sent out. One contains the standard soundtrack, while the other contains the soundtrack modified with the additional audio descriptions. When the SAP is selected, the modified soundtrack is played (see exhibit 8-3.1). This SAP can contain audio description (also known as video description), which is a method for making certain visual aspects in television, videos, multimedia products, and live performances accessible to people who are blind, visually impaired, or cognitively impaired.

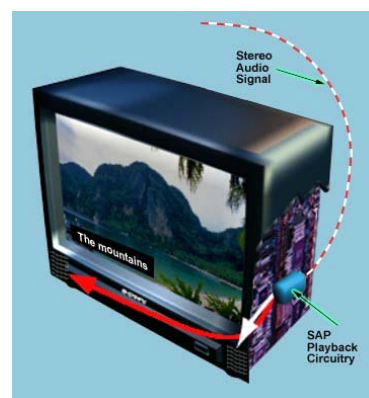


Exhibit 8-3.1: A diagram showing a stereo audio signal being received and interpreted or played back by SAP Playback Circuitry in a television display or computer monitor.

8-3.2 Techniques

8-3.2.1 Ensure That all Television Displays Include Secondary Audio Program (SAP) Playback Circuitry

All television tuner cards in televisions, video displays, kiosks, and computer equipment purchased by the Postal Service must include secondary audio program (SAP) playback circuitry. SAP playback circuitry supports Multi-channel Television Sound (MTS), which is required to play back stereo right and left audio tracks and SAP content such as audio descriptions.

8-3.2.2 Where Possible or for External Productions, Use Stereo Production and Broadcast Equipment

Where practical and possible, use equipment that is capable of producing, broadcasting, and receiving video or multimedia productions that include stereo audio and secondary audio program (SAP) content (i.e., audio descriptions). Stereo audio includes channels for left audio, right audio, and SAP audio, making it possible for audio descriptions to be played back in video and multimedia productions that include them (see section 8-3.2.1).

For internal productions, the current Postal Service infrastructure may not currently support stereo production and broadcast methods. When this is the case, video or multimedia productions that are mission critical must include open audio descriptions, or an alternate format or alternate access method must be provided.

For external productions, stereo production and broadcast methods must be used to ensure SAP playback capability or an alternate format or alternate access method must be provided to comply with Section 508.

8-3.2.3 Ensure That All Computer Media Players Support Open Standard Secondary Audio and Audiovisual Synchronization Methods

Digital media player software used on computer or kiosks for stand-alone or embedded playback must include decoders that decode captions and secondary audio encoded using SMIL markup or another industry-recognized open standard. Recommended by the World Wide Web Consortium (W3C), SMIL is an XML markup designed to be the standard markup language for timing and controlling synchronized media elements (i.e., video, audio tracks and descriptions, captions, and other media). SMIL works for a media player similar to the way that HTML works for a Web browser. And just as HTML markup displays in any browser, the standardized SMIL language fosters interoperability among varieties of media players (see the References below for more information).

8-3.3 Testing

For each technology or service that is developed or purchased, use the following general method to test compliance with the specific requirements in this section:

- Examine the hardware and software equipment used to transmit or display video or multimedia production content, including its associated online or offline documentation. Hardware and software can include equipment such as broadcast or transmission equipment, analog televisions and displays, digital televisions and displays, computer media players, or captioning system technology.
- Check to see if the hardware or software includes secondary audio program playback circuitry or a method for enabling and playing audio descriptions in video or multimedia production content.
- If the equipment supports audio description enabling, playback, and user preferences, attempt to play an audio-described video or multimedia production on the equipment. Check to see if audio descriptions can be enabled, played, and disabled properly.
- If the equipment does *not* support audio description playback, it should either be adapted to do so or not purchased by the Postal Service. If it is purchased, a general exception must be documented and approved by the responsible functional and Supply Management organizations.
- If the equipment is used by the Postal Service, all video or multimedia productions played on the equipment must include open audio descriptions, or an alternate format or alternate access method must be provided.

8-3.4 References

The following references provide additional guidance on the techniques described above, but must not be used in place of the general and specific Postal Service requirements in this chapter. If any of these references conflict with Postal Service requirements, defer to the Postal Service requirements.

- Access Board: 508 Universe: My training courses: Accessible Conferences
<http://www.section508.gov/training/index.cfm?FuseAction=CourseMenu&CourseID=2>
(**Note:** Site registration is required to access this link.)
- Apple Computer's "Quicktime and SMIL" Page
<http://www.apple.com/quicktime/authoring/qtsmil.html>
- CPB/WGBH National Center for Accessible Media: Description FAQ
<http://ncam.wgbh.org/dtv/basics/description.html>
- CPB/WGBH's National Center for Accessible Media: Motion Picture Access Project (MOPIX)
<http://ncam.wgbh.org/mopix/aboutproject.html>

- Department of Defense's Computer/Electronic Accommodations Program: Guidelines for Computer-Aided Real-Time Captioning (CART)
http://www.tricare.osd.mil/cap/services/services_acc_cart.cfm
- FCC: DTV Regulations
<http://www.fcc.gov/dtv/>
- United Kingdom Office of Communications (Ofcom): Guidance on Standards for Audio Description
http://www.itc.org.uk/codes_guidelines/broadcasting/tv/sub_sign_audio/audio_description_stnds/
- Joe Clark / Media Access: Comments on U.K. Guidelines for audio description
<http://joeclark.org/access/description/ukad.html>
- Macromedia Flash Player Home
<http://www.macromedia.com/software/flash/>
- Microsoft Windows Media Home Page
<http://www.microsoft.com/windows/windowsmedia/default.aspx>
- Real Networks SMIL Basics Tutorial
<http://www.realnetworks.com/resources/howto/smil/smilbasics.html>
- The Telecommunications Act of 1996
<http://www.access-board.gov/about/Telecomm Act.htm>
- The Television Decoder Circuitry Act of 1990
<http://www.access-board.gov/sec508/guide/1194.24-decoderact.htm>
- World Wide Web Consortium's list of SMIL Players
<http://www.w3.org/AudioVideo/#SMIL>

8-4 Captioning of Video and Multimedia Productions

All training and informational video and multimedia productions *that support the agency's mission*, regardless of format, that contain speech or other audio information necessary for the comprehension of the content, must be open or closed captioned (Section 508, Provision §1194.24c).

8-4.1 Rationale

Whereas section 8-2 addresses the reception, decoding, and display elements necessary to display captions, this requirement addresses the techniques used to *author or encode* the caption content in video or multimedia productions widely distributed via Postal Service television, Web sites, training software, and other information systems.

The Postal Service must provide captioning for any video or multimedia production that is distributed externally or that are considered critical to the Postal Service's mission. Such productions include, but are not limited to, those used in training, product or service demos, health or safety videos, or advertising produced for distribution on television or on the Internet. In applicable productions, the audio portions necessary for the comprehension

of the production's content must be captioned, so that people who are deaf or hearing impaired can access them.

Captioning is the standard method of making narrative content in television, videos, multimedia productions, and live performances accessible to people who are deaf and hearing impaired. "Multimedia productions" refers to productions that present information in more than one sensory mode (i.e., both audibly and visually), regardless of delivery method. For instance, streaming video presented via the Web with a soundtrack and a Macromedia Flash demo of a Postal Service Web application that uses both visual animation and audio narration are both considered multimedia productions.

Two kinds of captioning are used to provide access to the audio portions of video and multimedia products: *open captioning* and *closed captioning* (see the Glossary for definitions of these terms).

Besides aiding those with hearing loss, captions also do the following:

- Help persons with hearing disabilities. In an aging population, this group is increasing. According to the Census Bureau, 8 percent of the population under age 45 reports a hearing loss. This increases to 13 percent in the 45–64 age range and skyrockets to 30 percent after age 65!
- Increase learning, retention, and literacy. Allowing viewers to read the audio content provides additional reinforcement.
- Aid in learning a second language. Viewers can hear the one language being spoken and simultaneously read the captions.
- Facilitate the conveyance of audio content in environments that are noisy or are not conducive to playing audio (e.g., a quiet library or no sound card or speakers).

8-4.2 Techniques

8-4.2.1 When Display Mechanisms *Support* Closed Captioning, Include Closed Captioning on Broadcast or Taped Videos

When Postal Service television or video productions are dubbed onto videotape or broadcast via mechanisms that *support* closed captioning, the video production must include closed captioning. Supportability for closed captioning is covered in section 8-2. This requirement includes, but is not limited to, any pre-produced video productions that are distributed over television, Web, or computer-based TV channels and that are considered to be mission-critical, such as those used in training, product or service demos, health or safety videos, or advertising produced for distribution on television or the Internet.

Closed captioning is always created using a dubbing process. Using a master video (i.e., a dubmaster), a video program is first routed through an encoder that embeds the closed caption file data (i.e., the caption text equivalents) onto line 21 of the vertical blanking interval (VBI) of the television signal. This information is then recorded onto various formats that will result in a

closed-captioned master (i.e., VHS, SVHS, Beta SP, DigiBeta, DVCPPro, or DVD).

8-4.2.2 **When Display Mechanisms *Do Not Support* Closed Captioning, Include Open Captions on Taped Videos**

When Postal Service television or video productions are dubbed onto videotape or broadcast and the display mechanism is either unknown or does not support closed captioning, the video production must contain open captioning. This requirement includes, but is not limited to, any pre-produced video productions considered to be mission-critical, such as those used in training, product or service demos, health or safety videos, or advertising produced for distribution on television or on the Internet.

8-4.2.3 **Where Possible, Include Real-Time Captions for Mission-Critical or Public Live Events**

Where possible, include real-time captions in video or multimedia presentations used in live events that are organized or sponsored by the Postal Service and that are open to the general public. The real-time captions serve as a text equivalent for those portions of the audio presentation required for comprehension of the content.

Real-time captions can be provided using computer-aided real-time captioning (CART) systems that use typing or speech recognition technology to provide simultaneous open captions and immediate text transcripts. Usually, such captions will be authored by captioners, people who are especially skilled in capturing narration and key ambient sounds. These captioners employ court reporter-type equipment to type captions in real-time. The reporter equipment is connected to a computer and display equipment consisting of an LED screen or other large screen projection that, typically, is above the performers. Some systems offer the ability to transmit captions remotely, using phone lines, satellite feeds, or fiber optics.

For additional requirements related to live events, see Section 8-1.6, Alternate Formats, Alternate Access Methods, and Reasonable Accommodation.

8-4.2.4 **Include Captions in Mission-Critical Multimedia Productions**

Narrated portions of mission-critical Postal Service multimedia productions, regardless of how delivered (e.g., Web-delivered, CD-ROM, DVD, or software application), must be either open or closed captioned. Many multimedia productions used in product or service demos, training or educational media, and health and safety demos are considered “mission-critical.”

Closed captioning is preferred when the delivery and display mechanisms are known and available to support it (see section 8-2). However, if the broadcast and display mechanisms are unknown or cannot support closed captioning, open captioning must be used.

Computer-based training (CBT) products — including e-learning applications and other Postal training productions — can include multimedia as components of larger software applications, Web-based applications, or “closed” products. In these cases, relevant specific requirements for video and multimedia captioning and audio description must be satisfied in addition to other specific requirements found in other chapters. For example, a multimedia demo for Click-N-Ship™ distributed as an executable software application on CD-ROM would have to comply with video and multimedia captioning and audio description requirements, in addition to applicable software application requirements.

Some training software development applications (e.g., Macromedia Authorware or Click2Learn’s Toolbook) offer support for captioning multimedia. For example, some development applications support standard APIs for speech-to-text options (e.g., Speech Application Programming Interface included in the Microsoft Active Accessibility programming kit).

8-4.3 Testing

For each multimedia or video production that is developed or purchased, determine the delivery method for the production, then use the following general method to test compliance with the specific requirements in this section:

- **If the production is a video and the delivery method is unknown or not known to support closed captioning**, whether on tape or via broadcast, make sure that open captioning is permanently encoded on the video track of the production. If open captioning is not included, author and encode it before distribution.
- **If the production is a video and the delivery method is external or known to support closed captioning**, make sure that the production is encoded with closed captions. Test the video broadcast and display on equipment capable of decoding closed captioning. Ensure that the user can enable, view, and disable the caption track of the video.
- **If the production is a live event (e.g., conference or webcast)**, determine if a real-time captioning system technology and captioner resources can be used in the event. If not, ensure that an appropriate real-time alternate format or access method is available to all participants (see section 8-1.6).
- **If the production is a multimedia production and the delivery method is unknown or not known to support closed captioning**, make sure that narrated audio portions of the production required to understand the content are permanently encoded in equivalent text elements used in the production (i.e., open captioning).
- **If the production is a multimedia production and the delivery method is known to support closed captioning (e.g., SMIL)**, make sure that the narrated portions of the production required to understand the content are encoded in a caption track or equivalent alternate text that can be enabled, viewed, and disabled by the user.

8-4.4 References

The following references provide additional guidance on the techniques described above, but must not be used in place of the general and specific Postal Service requirements in this chapter. If any of these references conflict with Postal Service requirements, defer to the Postal Service requirements.

- Access Board: Captioning Time/Cost Considerations Matrix
<http://www.section508.gov/training/docs/captionCostMatrix.doc>
- Access Board: Checklist for Captioning Video and Multimedia
<http://www.section508.gov/training/docs/captionVendorQCChecklist.doc>
(Includes considerations for selecting/evaluating suppliers, preparations, and quality control elements.)
- Apple Computer's "Quicktime and SMIL" Page
<http://www.apple.com/quicktime/authoring/qtsmil.html>
- Caption Center
<http://www.wgbh.org/wgbh/pages/captioncenter/>
- Captioned Media Program
<http://www.cfv.org/>
- CPB/WGBH National Center for Accessible Media: Captioning FAQ
<http://ncam.wgbh.org/dtv/basics/captioning.html>
- CPB/WGBH National Center for Accessible Media: Media Access Generator (MAGPie)
<http://ncam.wgbh.org/webaccess/magpie/>
- DVS Theatrical is the technology that provides video and performance description
<http://www.wgbh.org/wgbh/pages/ncam/mopix/aboutproject.html#dvs>
- Macromedia Flash Player Home
<http://www.macromedia.com/software/flash/>
- Microsoft Windows Media Home Page
<http://www.microsoft.com/windows/windowsmedia/default.aspx>
- NCAM - National Center for Accessible Media
<http://www.wgbh.org/wgbh/pages/ncam/>
- NCAM's Motion Picture Accessibility Project
<http://ncam.wgbh.org/mopix/index.html>
- Real Networks SMIL Basics Tutorial
<http://www.realnetworks.com/resources/howto/smil/smilbasics.html>
- Rear window technology is explained at
<http://www.wgbh.org/wgbh/pages/ncam/mopix/aboutproject.html#rwc>
- World Wide Web (W3) Consortium's Synchronized Multimedia Integration Language Standard
<http://www.w3.org/AudioVideo/>

8-5 Audio Description of Video and Multimedia Productions

All training and informational video and multimedia productions *that support the agency's mission*, regardless of format, that contain visual information necessary for the comprehension of the content, should be audio described where possible (Section 508, Provision §1194.24d).

8-5.1 Rationale

Whereas section 8-3 addresses the secondary audio program (SAP) playback circuitry necessary to decode audio descriptions, this requirement addresses the techniques used to *author and encode* the audio description content in video or multimedia productions widely distributed via Postal Service television, Web sites, and other information systems.

Where possible, the Postal Service provides audio description for any video or multimedia production that is distributed externally or that is considered critical to the Postal Service's mission. Such productions include, but are not limited to, those used in training, product or service demos, health or safety videos, or advertising produced for distribution on television or the Internet. In applicable productions, the visual portions necessary for the comprehension of the production's content must be audio described so people who are blind or visually impaired can access them.

Audio description is a method for making certain visual aspects in television, videos, multimedia productions, and live performances accessible to people who are blind, visually impaired, or cognitively impaired. "Multimedia productions" refers to productions that present information in more than one sensory mode (i.e., both audibly and visually), regardless of delivery method. For instance, streaming video presented via the Web with a soundtrack and a Macromedia Flash demo of a Postal Service Web application that uses both visual animation and audio narration are both considered multimedia productions.

There are two kinds of audio description that are used to provide access to visual portions of video and multimedia productions that are critical for their comprehension: *open audio description* and *closed audio description* (see the Glossary for definitions of these terms).

The advantages of audio descriptions cited most by blind and visually impaired viewers include the following:

- Gaining knowledge about the visual world and a better understanding of televised materials.
- Feeling independent and reducing the burden on sighted viewers with whom they watch.
- Experiencing social connection, enjoyment, and equality with those without visual impairments.

8-5.2 Techniques

8-5.2.1 When Display Mechanisms *Do Not Support* SAP Playback, Include Open Audio Description on Taped Videos

Where possible and practical, include open audio descriptions on video productions when Postal Service television or video productions are dubbed onto videotape or broadcast, and the display mechanism is either unknown or does not support secondary audio program (SAP) playback. In this case, the video production should be delivered with two versions, one with and one without descriptions, often back-to-back on the same tape cassette.

Open audio description can be used to provide limited audio descriptions on the primary audio tracks instead of on an SAP channel. The open audio description technique may be more feasible than standard audio description, as the narration recorded on one primary audio track could include descriptions of key visual elements along with the main narration, if planned for in advance.

For example, a Postal Service training video that demonstrates the correct way for letter carriers to unload boxes from a truck could be produced so that open audio descriptions are permanently encoded in the production's narration. Instead of merely demonstrating the correct procedure for unloading boxes, all viewers could hear descriptions of enacted visuals because they are included in the narration (i.e., "a letter carrier unloads the boxes from her truck, being careful not to bend using her back"). When such open audio descriptions are included in the main audio tracks, they can be easily included in text transcripts, often eliminating the need to produce a secondary audio program or track.

This requirement includes, but is not limited to, any pre-produced video productions considered to be mission-critical, such as those used in training, product or service demos, health or safety videos, or advertising produced for distribution on television or on the Internet.

8-5.2.2 When Display Mechanisms *Support* SAP Playback, Include Audio Description on Broadcast or Taped Videos

When Postal Service television or video productions are dubbed onto videotape or broadcast via mechanisms that *support* SAP playback, the video production should include standard (i.e., closed) audio description, if possible. Supportability for SAP playback is covered in section 8-3. This requirement includes, but is not limited to, any pre-produced video productions that are distributed over television, Web, or computer-based TV channels and that are considered to be mission-critical, such as those used in training, product or service demos, health or safety videos, or advertising produced for distribution on television or on the Internet.

Audio description is always created using a dubbing process. Using a master video (i.e., a dubmaster), a video program is first routed through an encoder which embeds the primary and secondary audio program tracks onto tape or onto the broadcast signal. This information can then be recorded onto various

formats that will result in an audio-described master (i.e., VHS, SVHS, Beta SP, DigiBeta, DVCPPro, or DVD).

8-5.2.3 **Where Possible, Include Audio Descriptions for Mission-Critical or Public Live Events**

Where possible (e.g., where events are scripted ahead of time, where technologies are available), include audio descriptions for video or multimedia presentations used in live events that are organized or sponsored by the Postal Service and that are open to the general public. The audio descriptions serve as a text equivalent for those portions of the visual presentation required for comprehension of the content.

In some cases (i.e., when events are well-scripted and planned in advance), audio descriptions can be provided using technology systems that offer remote transmission of audio via radio or phone lines, satellite feeds, or fiber optics. Usually, such audio descriptions will be authored by describers, people who are especially skilled in capturing narration, key ambient sounds and visually significant elements of presentations. These describers employ court reporter equipment or speech to communicate visually significant elements of presentations in real-time. However, describers usually need to review the video production and make extensive notes before they begin.

Audio descriptions do not necessarily involve technology per se. Two examples describe such nontechnological approaches to audio description:

- During video teleconferences or webcasts where presenters use several visual aids, consider providing an additional person off-screen to describe the visuals quickly and discreetly. Make sure you alert all of the meeting participants of this need to allow time for description so that they can adjust their presentation accordingly.
- During a webcast, when a presenter is demonstrating features of new purchasing software, the presenter should exactly describe the actions she is performing (i.e. “from the ‘File’ menu, select the ‘Import...’ option. When the ‘Import’ dialog box appears, select the ‘Browse’ button to select a file to import.”) That way, even those participants with visual impairments will still be able to follow the presentation.

For additional requirements related to live events, see Section 8-1.6, Alternate Formats, Alternate Access Methods, and Reasonable Accommodation.

8-5.2.4 **Where Possible, Include Audio Descriptions in Mission-Critical Multimedia Productions**

Where possible, provide audio description for critical visual portions of mission-critical Postal Service multimedia productions, regardless of how delivered (e.g., web-delivered, CD-ROM, DVD, or software application). Many multimedia productions used in product or service demos, training or educational media, and health and safety demos are considered “mission-critical.” When such productions contain visual elements that are critical for comprehension of the content, an audio description or appropriate alternate format or alternate access method must be provided.

Closed audio description is preferred when the delivery and display mechanisms are known and available to support it (see section 8-3). For example, a multimedia demo that uses visual demonstration and narration to describe safe mail delivery procedures could offer audio descriptions that can be turned on and off for the visual demonstrations.

However, if the delivery and display mechanisms are unknown or cannot support audio description or secondary audio program playback, include audio descriptions in the primary audio channel. For example, the same multimedia demo referred to above that uses visual demonstration and narration to describe safe mail delivery procedures could offer audio descriptions in the primary audio track (which would not be able to be turned off).

Computer-based training (CBT) products — including e-learning applications and other Postal Service training productions — can include multimedia as components of larger software applications, Web-based applications, or “closed” products. In these cases, relevant specific requirements for both multimedia production audio descriptions must be satisfied in addition to other specific requirements found in other chapters. For example, a multimedia demo for Click-N-Ship™ distributed as an executable software application on CD-ROM would have to comply with both video and multimedia requirements, in addition to software application requirements. Some training or CBT software development applications offer support for audio-describing multimedia.

8-5.3 Testing

For each multimedia or video production that is developed or purchased, determine the delivery method for the production, then use the following general method to test compliance with the specific requirements in this section:

- If the production is a video and the delivery method is unknown or not known to support closed audio description, whether on tape or via broadcast, make sure that, where possible, open audio descriptions are permanently encoded on the audio track of the production. If they are not, author and encode them before distribution.
- If the production is a video and the delivery method is external or known to support closed audio description, make sure that, where possible, the production is encoded with closed audio descriptions. Test the video broadcast and display on equipment that is capable of SAP playback. Ensure that the user can enable, view, and disable the secondary audio program track (i.e., closed audio descriptions) on the video.
- If the production is a live event (e.g., conference or webcast), determine if a real-time audio descriptions of critical visual information can be provided using either a technology-based system (e.g., remote transmission of audio via radio or phone lines, satellite feeds, or fiber optics) or a non-technology solution such as a modified presentation script or off-screen audio describer. Ensure that an appropriate

real-time alternate format or access method is available to all participants (see section 8-1.6).

- If the production is a multimedia production and the delivery method is unknown or not known to support closed audio description, make sure that visual portions of the production required to understand the content are permanently encoded in a primary audio track or in equivalent text elements used in the production.
- If the production is a multimedia production and the delivery method is known to support audio descriptions, make sure that the visual portions of the production required to understand the content are encoded in a secondary audio track or equivalent alternate text that can be enabled, viewed, and disabled by the user.

8-5.4 References

The following references provide additional guidance on the techniques described above, but must not be used in place of the general and specific Postal Service requirements in this chapter. If any of these references conflict with Postal Service requirements, defer to the Postal Service requirements.

- Access Board: 508 Universe: My training courses: Accessible Conferences
<http://www.section508.gov/training/index.cfm?FuseAction=CourseMenu&CourseID=2>
(**Note:** Site registration is required to access this link.)
- Access Board: Checklist for Audio Describing Video and Multimedia
<http://www.section508.gov/training/docs/audioDescChecklist.doc>
(Includes questions for evaluating suppliers, materials to provide suppliers, and quality control elements.)
- American Foundation for the Blind: "Video Description in North America"
http://www.afb.org/info_document_view.asp?documentid=1231
- Apple Computer's "Quicktime and SMIL" Page
<http://www.apple.com/quicktime/authoring/qtsmil.html>
- CPB/WGBH National Center for Accessible Media: Description FAQ
<http://ncam.wgbh.org/dtv/basics/description.html>
- CPB/WGBH National Center for Accessible Media: Media Access Generator (MAGPie)
<http://ncam.wgbh.org/webaccess/magpie/>
- Department of Defense's Computer/Electronic Accommodations Program: Guidelines for Computer-Aided Real-Time Captioning (CART)
http://www.tricare.osd.mil/cap/services/services_acc_cart.cfm
- United Kingdom Office of Communications (Ofcom): Guidance on Standards for Audio Description
http://www.itc.org.uk/codes_guidelines/broadcasting/tv/sub_sign_audio/audio_description_stnds/

- Joe Clark / Media Access: Comments on U.K. Guidelines for audio description
<http://joeclark.org/access/description/ukad.html>
- Macromedia Flash Player Home
<http://www.macromedia.com/software/flash/>
- Microsoft Windows Media Home Page
<http://www.microsoft.com/windows/windowsmedia/default.aspx>
- Real Networks SMIL Basics Tutorial
<http://www.realnetworks.com/resources/howto/smil/smilbasics.html>
- Washington Ear: Audio Description
<http://www.washear.org/audiod.htm>
- World Wide Web (W3) Consortium's Synchronized Multimedia Integration Language Standard
<http://www.w3.org/AudioVideo/>

8-6 User-Selectable Captions or Audio Descriptions

Display or presentation of alternate text presentation (i.e., captions) or audio descriptions must be user-selectable, unless they are permanent (Section 508, Provision §1194.24e).

8-6.1 Rationale

When video and multimedia productions provide either closed captioning or closed audio description — regardless of their delivery method — viewers must be given the ability to enable or disable them, using an intuitive and easy-to-use selection feature.

Given the current state and prevalence of analog technology, the “user-selectable” requirement applies only to forms of closed approaches for captioning and audio description, when the production, transmission, and display mechanisms are known, available to support it and at the control of the viewer (see sections 8-2 and 8-3). In some situations, such as Postal Service television broadcasts in public spaces, the viewer does not control the display. In this case, the “user-selectable” requirement does not apply to the individual user but to the persons administrating the system. However, if video content containing closed captions is played on a desktop computer where the viewer does have control, the “user-selectable” requirement is applicable.

While analog technologies are limited, digital media production, distribution and display methods (e.g., CD-ROMs, DVDs, or Web) provide increasing support for alternate channels. These alternative visual and auditory channels and methods can be used to integrate captions and audio description more easily into digital video and multimedia productions.

8-6.2 Techniques

8-6.2.1 Offer Features for User Selection of Closed Captions

When closed captions are provided, video or multimedia productions (or the information technology of which they are a component) must offer a feature, where possible, that allows users or administrators to turn them on and off independently. The method used for selecting closed captions varies greatly depending on the video or multimedia format and display methods used. For example, on-screen menus must offer a text-based menu option that does not require hearing and that allows users to enable or disable closed captions.

In addition, controls provided to enable or disable captions must comply with other specific requirements found in other chapters of this handbook. For example, for multimedia that requires a media player software application to view it, the controls used in the software application must comply with applicable requirements in Chapter 5, Software Applications and Operating Systems (e.g., keyboard access, textual information, or on-screen focus).

8-6.2.2 Offer Features for User Selection of Closed Audio Descriptions

When audio description is provided, video or multimedia productions (or the information technology of which they are a component) must offer a feature, where possible, that allows user to turn them on and off independently. The method used for selecting closed audio descriptions varies greatly, depending on the type of video and multimedia format and display used. For example, an on-screen menu that offers a feature to enable or disable audio description must be made audible or otherwise readily selectable so that people with visual disabilities can independently gain access to audio descriptions. The menu should also be intuitive and easy to use so that the procedure will be convenient and possible to follow. In addition, controls provided to enable or disable audio descriptions must comply with other specific requirements found in other chapters of this handbook.

8-6.3 Testing

For each multimedia or video production that is developed or purchased, determine the delivery method for the production, then use the following general method to test compliance with the specific requirements in this section:

If the production is a closed-captioned video or multimedia production that can be viewed by an individual user, regardless of the display mechanism (e.g., Postal Service television, IP-based television, media players, or a Web-based presentation), you must do the following:

- Make sure that the information technology used to display the video or multimedia production offers a feature that allows the user to turn the captions on and off independently. This feature must be documented and communicated to the user.

- Make sure that the controls provided to turn captions on and off — whether hardware or software — comply with other specific requirements found in other chapters of this handbook.
- If the captions cannot be turned on and off, if the controls used to do so are not compliant with applicable requirements in other chapters of this handbook, or the feature is not documented and communicated, use a different information technology to deliver the production, or author and encode open captioning in the video or multimedia production before distributing it (see sections 8-4.2.2 and 8-4.2.4).

If the production is an audio-described video or multimedia production that can be viewed by an individual user, regardless of the display mechanism (e.g., Postal Service television, IP-based television, media players, or a Web-based presentation), you must do the following:

- Make sure that the information technology used to display the video or multimedia production offers a feature that allows the user to turn the audio descriptions on and off independently. This feature must be documented and communicated to the user.
- Make sure that the controls provided to turn audio descriptions on and off — whether hardware or software — comply with other specific requirements found in other chapters of this handbook.
- If the audio descriptions cannot be turned on and off, if the controls used to do so are not compliant with applicable requirements in other chapters of this handbook, or the feature is not documented and communicated, use a different information technology to deliver the production, author and encode open audio descriptions in the video or multimedia production before distributing it, or provide an appropriate alternate format or access method (see sections 8-5.2.2 and 8-5.2.4).

8-6.4 References

The following references provide additional guidance on the techniques described above but must not be used in place of the general and specific Postal Service requirements in this chapter. If any of these references conflict with Postal Service requirements, defer to the Postal Service requirements.

- Access Board: 508 Universe: My training courses: Accessible Conferences
<http://www.section508.gov/training/index.cfm?FuseAction=CourseMenu&CourseID=2>
(**Note:** Site registration is required to access this link.)
- Access Board: Captioning Time/Cost Considerations Matrix
<http://www.section508.gov/training/docs/captionCostMatrix.doc>
- Access Board: Checklist for Audio Describing Video and Multimedia
<http://www.section508.gov/training/docs/audioDescChecklist.doc>
(Includes questions for evaluating suppliers, materials to provide suppliers, and quality control elements.)
- Access Board: Checklist for Captioning Video and Multimedia
<http://www.section508.gov/training/docs/captionVendorQCChecklist.doc>

(includes considerations for selecting/evaluating suppliers, preparations, and quality control elements)

- American Foundation for the Blind: “Video Description in North America”
http://www.afb.org/info_document_view.asp?documentid=1231
- Apple Computer’s “Quicktime and SMIL” Page
<http://www.apple.com/quicktime/authoring/qtsmil.html>
- Caption Center
<http://www.wgbh.org/wgbh/pages/captioncenter/>
- Captioned Media Program
<http://www.cfv.org/>
- CPB/WGBH National Center for Accessible Media: Captioning FAQ
<http://ncam.wgbh.org/dtv/basics/captioning.html>
- CPB/WGBH National Center for Accessible Media: Description FAQ
<http://ncam.wgbh.org/dtv/basics/description.html>
- CPB/WGBH National Center for Accessible Media: Media Access Generator (MAGPie)
<http://ncam.wgbh.org/webaccess/magpie/>
- Department of Defense’s Computer/Electronic Accommodations Program: Guidelines for Computer-Aided Real-Time Captioning (CART)
http://www.tricare.osd.mil/cap/services/services_acc_cart.cfm
- United Kingdom Office of Communications (Ofcom): Guidance on Standards for Audio Description
http://www.itc.org.uk/codes_guidelines/broadcasting/tv/sub_sign_audio/audio_description_stnds/
- Joe Clark / Media Access: Comments on U.K. Guidelines for audio description
<http://joeclark.org/access/description/ukad.html>
- Macromedia Flash Player Home
<http://www.macromedia.com/software/flash/>
- Microsoft Windows Media Home Page
<http://www.microsoft.com/windows/windowsmedia/default.aspx>
- NCAM - National Center for Accessible Media
<http://www.wgbh.org/wgbh/pages/ncam/>
- Real Networks SMIL Basics Tutorial
<http://www.realnetworks.com/resources/howto/smil/smilbasics.html>
- Washington Ear: Audio Description
<http://www.washear.org/audiod.htm>
- World Wide Web (W3) Consortium’s Synchronized Multimedia Integration Language Standard
<http://www.w3.org/AudioVideo/>
- World Wide Web (W3) Consortium’s Synchronized Multimedia Integration Language Standard
<http://www.w3.org/AudioVideo/>

Appendix 8-A

Postal Service Video and Multimedia Accessibility Checklist

Use this as a tool for high-level guidance in determining if a video or multimedia production is compliant or accessible.

| | Requirement | Yes No N/A | Comments |
|-----|--|------------------|----------|
| 8-2 | <p>Analog and Digital Video Caption Receivers, Decoders, and Displays</p> <p>All analog television displays 13 inches and larger, and computer equipment that includes analog television receiver or display circuitry, must be equipped with caption decoder circuitry that appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals. As soon as practicable, but not later than July 1, 2002, widescreen digital television (DTV) displays measuring at least 7.8 inches vertically, DTV sets with conventional displays measuring at least 13 inches vertically, and stand-alone DTV tuners, whether or not they are marketed with display screens, and computer equipment that includes DTV receiver or display circuitry, must be equipped with caption decoder circuitry which appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals (Section 508, Provision §1194.24a).</p> | | |
| 8-3 | <p>Television Tuners and Secondary Audio Playback Circuitry</p> <p>Television tuners, including tuner cards for use in computers, must be equipped with secondary audio program playback circuitry (Section 508, Provision §1194.24b).</p> | | |
| 8-4 | <p>Open or Closed Captioning of Video and Multimedia Productions</p> <p>All training and informational video and multimedia productions <i>that support the agency's mission</i>, regardless of format, that contain speech or other audio information necessary for the comprehension of the content, must be open or closed captioned (Section 508, Provision §1194.24c).</p> | | |

| | Requirement | Yes No N/A | Comments |
|-----|---|---------------------------|-----------------|
| 8-5 | Audio Description of Video and Multimedia Productions All training and informational video and multimedia productions <i>that support the agency's mission</i> , regardless of format, that contain visual information necessary for the comprehension of the content, should be audio described where possible (Section 508, Provision §1194.24d). | | |
| 8-6 | User-Selectable Captions or Audio Descriptions Display or presentation of alternate text presentation (i.e. captions) or audio descriptions must be user-selectable, unless they are permanent (Section 508, Provision §1194.24e). | | |

Summary of Video and Multimedia Delivery Methods and Requirements

Use this as a reference tool for understanding detailed specific requirements found in this chapter. Note that only content determined to be “critical” to the Postal Service’s mission is required to comply with these captioning and audio description requirements.

| Delivery Mechanism or Component | Captioning Requirements | Audio Description Requirements | Alternate Formats & Access Methods |
|---|--|---|--|
| Television broadcast video content where at least one production or transmission element is analog | Open captions | Provide open audio description where possible in primary audio track and captions. | Optional; provide if needed. |
| Stereo television broadcast video content where no elements are analog | Closed captions; must be user-selectable | Closed audio description; must be user-selectable | Optional; provide if needed. |
| VHS format taped video content (except raw footage) | Open captions; may provide both uncaptioned and open captioned versions on one tape. | Provide open audio description where possible in primary audio track (and captions); may provide both audio described and non-described versions on one tape. | Optional; provide if needed. |
| Analog display hardware | May have built-in caption decoders; if not, must add on or provide alternate format/access method. | Hardware may not include SAP playback circuitry in tuner card; if not, you must provide open audio descriptions or alternate format / access method. | You must provide if no caption decoder or SAP playback is available in the hardware. |
| Digital televisions, digital video receivers, computer display hardware | Must have built-in caption decoders for closed captioning; must be user-selectable. | Must include SAP playback circuitry; must be user-selectable | Optional; provide if needed. |
| Digital media player software | Must provide captioning support; must be user-selectable | Must provide SAP or equivalent channel playback; must be user-selectable | Optional; provide if needed. |

| Delivery Mechanism or Component | Captioning Requirements | Audio Description Requirements | Alternate Formats & Access Methods |
|--|---|---|--|
| Mission-Critical live events that present video or multimedia content (except for taped content) | Must provide real-time captioning services or alternate format / access method. | Must provide real-time audio description or alternate format / access method. | Optional; provide if needed or for replay. |
| Mission-critical pre-produced multimedia productions regardless of how delivered (e.g., Web, CD-ROM, DVD, software application, etc.) | Closed captioning preferred, but open captioning OK. If closed captioning provided, must be user-selectable | Closed audio description preferred, but open audio description OK. If closed audio description provided, must be user-selectable. | Optional; provide if needed. |

9 Self-Contained, Closed Products

9-1 Overview

9-1.1 Contents

This chapter contains the specific electronic and information technology (EIT) performance requirements related to the following subpart of Section 508:

EIT Technical Standard 1194.25, Self-Contained, Closed Products, Provisions (a) thru (j).

9-1.2 Summary

9-1.2.1 Technology

The term “self-contained” is used to define a class of information technology. Unlike personal computers, which can have assistive technology installed, closed products can be accessible only if they have been designed to be accessible by people with limited vision, mobility, or hearing.

The requirements in this chapter cover the following:

- Any products or systems that do not permit end-user-installed assistive technologies. Such products often involve input and output interactions that present accessibility challenges (e.g., touch screens, physical layout/positioning). Unlike personal, customizable devices, many products in this class of technology (kiosks, shared printers) are used by the general public.
- Since they cannot be customized, such closed products must be designed with the needed accessibility features for all users.
- Given the functional disabilities of mobility, hearing, speech, and vision, Subpart C (Functional Performance Criteria) defines the general goal for all closed products as follows: At least one mode of operation and information retrieval must be usable by a user with a disability.
- For self-contained, closed products to be accessible to blind people, the law specifies audio output will be provided to an external headset jack. Provision (a) clarifies that “personal headsets for private listening are not assistive technology.”

- The following types of devices are named in the law:
 - *Information kiosks and information transaction machines:* Equipment used by the public to transact business without personal interaction. The classic example of an information transaction machine is an ATM (automated [bank] teller machine). Banks have made considerable progress, resulting from ADA legislation and consequent lawsuits, in making ATM machines reasonably accessible.
 - *Copiers:* Although early designs of copiers were primarily devices without electronic sophistication, newer designs often contain higher degrees of functionality, such as the ability to interface with desktop computers that can be made universally accessible.
 - *Printers:* Like copiers, printers have extensive functions — many of which can be accessed by standard control panels displayed and updated from personal computers. To the extent that the control panels follow the standards described in Chapter 5, Software Applications and Operating Systems, these devices may be fully compliant.
 - *Calculators:* Although most calculator functions are an integral part of PC application software and governed by the standards described in Chapter 5, Software Applications and Operating Systems, accessible calculators usable by people with disabilities can be acquired. Specialized procurement for a specific accommodation of an employee is a 504 solution rather than a 508 compliance decision. Information on possible alternate formats or modes can be noted when a non-accessible EIT purchase is made. For more information, see the FAQ on accessible calculators at Tech Connections (<http://www.techconnections.org/resources/guides/Calculators.cfm>).
 - *Fax machines:* Like copiers, fax machines have extensive functions — many of which can be accessed from standard control panels displayed and updated from personal computers. To the extent that the control panels follow the standards described in Chapter 5, Software Applications and Operating Systems, these devices may be fully compliant. It should be noted that many fax machines also support of telecommunications functions — that is, the ability to use an attached handset for a traditional voice call. When this functionality is present, the requirements in chapter 5 also apply.
 - *Similar types of electronic office equipment:* The law states that this standard applies to, but is not limited to, the above listed devices. At the time of the drafting of the 508 standards, Personal Data Assistants (PDA devices) were, functionally, closed products — and were included in many discussions of the provisions in this chapter. According the questions and answers page on the GSA's Section 508 Web site: "This technology is

‘electronic and information technology’ covered by Section 508 and the Access Board’s standards. Most hand held devices currently fall in the category of ‘self contained closed products.’ As technology advances, hand held devices may fall into other categories as well.”

PDA devices: These devices, if they do not permit additional functions to be added, are closed products. PDA devices that can be modified (software development kit utilities enable the creation of new applications that run under a defined operating system), come under the standard for software applications and operating systems discussed in chapter 5. To the extent that a PDA has telecommunications functions, it comes under the standard discussed in Chapter 7, Telecommunications Products.

This standard in this chapter, 1194.25, covers a single class of technology: technology that is closed to the installation of software that can enable access. The provisions in this standard apply to a single device, devices that represent the convergence of multiple standards (e.g., a fax machine that supports voice communications), or to self-contained devices within a complex systems.

9-1.2.2 **Audience**

This chapter applies to anyone who buys or develops self-contained, closed products or systems for the Postal Service (i.e., Postal Service employees, suppliers, contractors, and business partners).

9-1.3 **Structure and Use**

Each part of this chapter describes the specific requirements that support one or more provisions in the technical standards for self-contained, closed products. The technical standards of Section 508 were written primarily from a technology perspective. The Postal Service may consolidate some provisions to help Postal Service employees and business partners understand Postal Service compliance requirements from the perspective of designing for accessibility. Each specific requirement includes a rationale, techniques, testing methods, and references as shown below in section 9-2.

9-1, Overview

9-2, Usability Without Assistive Technology (Provision §1194.25a)

- Rationale
- Techniques
- Testing
- References

9-3, Allowing Sufficient Time (Provision §1194.25b)

9-4, Touch Screens or Contact-Sensitive controls (Provision §1194.25c)

9-5, Biometric Forms of User Identification or Control (Provision §1194.25d)

9-6, Auditory Output (Provision §1194.25e)

9-7, Voice Output in a Public Area (Provision §1194.25f)

9-8, Color Coding (Provision §1194.25g)

9-9, Range of Color Selections (Provision §1194.25h)

9-10, Screen Flickering (Provision §1194.25i)

9-11, Operable controls on Freestanding, Non-Portable devices (Provision §1194.25j)

Appendix 9-A, Checklist

9-1.4 Introduction to Self-Contained, Closed Product Accessibility

Products covered by this standard present challenges from the perspective of device size and dimensions (e.g., can someone in a wheelchair reach the controls of a copier?), user input (what touch screen area or button controls which function?), user feedback (did the function activate? what is the error message?). These challenges vary by type of physical impairment:

- Deaf persons and hearing-impaired (but not deaf) persons are typically faced with challenges such as audible beeps that have no visual counterpart
- Visually impaired and blind persons are typically faced with challenges such as:
 - Identification of buttons and controls for input.
 - Interaction with an alternative to a touch screen (keypad or alternative).
 - Enlarged print or synthetic speech to convey device output.
- Dexterity or mobility-impaired persons are typically faced with challenges such as:
 - Control functions located beyond range of user's reach.
 - Lack of timeout controls and saving of user input upon timeout.
 - Inaccessible hardware keys, controls and switches.
 - Lack of error-recovery features.
 - Reliance on voice or manual input.

9-1.5 General Requirements

Accessibility is accomplished by purchasing or developing self-contained, closed products that accommodate the widest range of users, including those with disabilities. Listed below are some general requirements that will help the Postal Service ensure continued accessibility of self-contained, closed products:

- The Postal Service will develop and procure self-contained, closed products that take advantage of built-in accessibility features when those features are available to both end users and product developers.

- The Postal Service will procure or develop self-contained, closed products that recognize and maximize the capabilities of the accessibility features installed and activated by a user via an attached personal computer (e.g., operating system features and assistive technologies that enable control of dialogue boxes to activate device controls). Postal Service self-contained, closed products procurement personnel and developers should do the following:
 - Buy or build products that support self-contained, closed products standards. Accessibility features are often integrated with these standards in order to ensure accessibility in self-contained, closed products (standard kiosk shapes have been developed to meet appropriate reach specifications — provision j). Standards related to each specific requirement are shown in the “References” area under that requirement.
 - Where possible, use standard hardware and software controls instead of custom controls. These standard controls often already support product accessibility features. Using them will often eliminate the need for additional configuration or programming to provide explicit accessibility support, unless the behavior of the standard controls has been enhanced. Full-screen keyboards are well understood. Many self-contained, closed products support the attachment of such input devices. Telephone-style key clusters are another *de facto* standard.
 - Provide flexibility in using a variety of input methods and output methods. Many self-contained, closed products support only one mode of operation. When such devices can be added to a network, people with disabilities may be able to access these products from a personal computer that has assistive technology.
 - Consult with accessibility experts and representatives of the disability community when developing unique devices. Assistive technology products for personal computers represent standard solutions to *open* products. Since there are no comparable, market-tested standard solutions for self-contained, closed products, each new development provides an opportunity to demonstrate the Postal Service’s intent to provide the most accessible solution. Accessibility experts and representatives of the disability community are a resource that can vastly enhance the designs of engineers and solution architects.

Finally, Postal Service employees are required to register certain software applications and operating systems in the Enterprise Information Repository (EIR) (<http://eir>). This information will be used to report compliance and includes any related Section 508 noncompliance issues.

9-1.6 **Testing for Compliance**

When testing self-contained, closed products for compliance, it is crucial to be aware of the end-user environment. This includes an understanding of the product's stated accessibility features in the context of Postal Service use.

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by disabled users. Automated testing tools or integrated development environment (IDE) features, useful in open environments, are of little value for closed products. Simulation of use by people with disabilities provides the clearest indication of accessibility.

9-2 **Usability Without Assistive Technology**

Self-contained products must be usable by people with disabilities without requiring an end user to attach assistive technology to the product. Personal headsets for private listening are not assistive technology (§1194.25, Provision a).

9-2.1 **Rationale**

Self-contained products, unlike personal computers, do not support assistive technology software. Consequently, unlike other provisions that allow a product to meet the standards by being compatible with assistive technology, this provision requires self-contained, closed products to contain built-in accessibility. Most of the technical standards for Subpart B of the law — 1194.21 Software applications and operating systems; 1194.22, Web-based Intranet and Internet information and applications; 1194.24, Video and multimedia products (to the extent that they are embedded in a Web page or application); 1194.26, Desktop and portable computers) — assume that part of the solution to accessibility is the installation of assistive technology (e.g., speech synthesis or voice recognition). For people with disabilities to use self-contained products, the functionality of assistive technology must be an integral part of the design. That is, the functional performance criteria of Subpart C (1194.31) apply: that input and output must be available for people with limited mobility, hearing, speech, and vision.

A personal headset is considered a personal device for audio output, since it is not considered installed assistive technology. Headsets might be also used for privacy in addition to accessibility reasons.

9-2.2 **Techniques**

9-2.2.1 **For Kiosks**

- *ITM Kiosk without full PC interface:* For kiosks that have no full PC functionality (e.g., an ATM), the device should not only allow user input with limited mobility but should also include a headset jack that provides speech output of all screen instructions, data, and key-press locations.

- *ITM Kiosk with full PC interface:* Some kiosk implementations are created by placing a PC in a kiosk enclosure. Such implementations pose a challenge in that they provide access to operating system functions, application functions, and Internet access. These systems can have assistive technology software (speech synthesis, screen magnification, voice recognition) installed. However, they are not configured for a specific person with a specific disability — as is the case of a personal workstation allocated to a specific Postal Service employee. Their public, multi-user access makes disability-specific configuration difficult. One solution is to add a large print and voice-output menu selection at the start of each session: The menu would be similar to the language-choice menu on ATMs, which enables the user to select an assistive device configuration for the session.

9-2.2.2 **For Copiers, Printers, Calculators, Fax Machines:**

- *COTS without PC interface:* For simple (Commercial Off The Shelf) devices that have no interface via a connected PC (either directly attached to the device or indirectly via a network), research of a COTS vendor's VPAT specification will enable the Postal Service to find the most compliant device that needs the business requirements.
- *COTS / non-standard with a PC interface:* For high-end devices that do have an interface via a connected PC (either directly attached or on the network), research of vendor's VPAT specification will enable the Postal Service to find the most compliant device that meets the business requirements through a software interface that complies with the provisions of Chapter 5, Software Applications and Operating Systems).

9-2.2.3 **For PDAs**

- *For PDAs that are closed systems:* Despite the difficulty of finding compliant devices in this category, the essential functions can often be adapted. See the references listed below.
- *For PDAs that have operating systems:* As of the draft date of this publication, no existing PDA has the rich array of assistive technology found in a PC platform. However, AT software for these devices can be developed. VPAT comparison and business requirements should drive a continual advance toward full compliance.

9-2.3 **Testing**

- a. Inspect the product to identify if the device provides a function allowing access, as specified, by persons with limited vision, hearing, or mobility.
- b. If the voice output is designed to be usable by people who are blind, perform the following tests on the device with all visible outputs disabled.
 - (1) Evaluate a prototype with accessibility experts.
 - (2) Evaluate functions with an experienced user.
 - (3) Evaluate functions with a novice user.

- c. If a touch screen is used for user input, insure that all functions can be used by alternate key-press system.
- d. If an exception was taken when procuring a device that is not fully accessible, define the alternate format or alternate method needed to provide equivalent access to people with disabilities who can not readily use the device.

9-2.4 References

The following references apply to the specific requirements stated here:

- Trace Center Research on Kiosk accommodation (Note sub-page for unique approach: EZ Access keys)
<http://www.tracecenter.org/world/kiosks/>
- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25).
<http://www.access-board.gov/sec508/guide/1194.25.htm>
- PDA references
California State University, Northridge
<http://www.csun.edu/cod/conf/2004/proceedings/274.htm>
TechDis Accessibility and Generic Features of a PDA
<http://www.techdis.ac.uk/PDA/intro3.htm>
National Center on Accessible Information Technology in Education
<http://www.washington.edu/accessit/articles?62>
palmOne Accessibility Program
<http://www.palmone.com/us/company/corporate/pap/>
University of Toronto
<http://learningportal.utoronto.ca/technology/pda.html>

9-3 Allowing Sufficient Time

When a timed response is required, the user must be alerted and given sufficient time to indicate more time is required. (§1194.25, Provision b).

9-3.1 Rationale

When a system requires a user to respond within a specified time, some people with mobility or dexterity limitations will be unable to complete input functions. This provision addresses access problems that can arise when self-contained, closed products require a response from a user within a certain time. For example, persons with dexterity-related disabilities might find entering information, such as a Social Security number, within a specified time to be difficult or impossible. This provision requires that users must be notified when a process is about to time out and must be given an opportunity to answer a prompt asking whether additional time is needed.

Since some self-contained, closed products do not require a timed user response, this provision does not apply to them. However, in some devices (e.g., entry of receiving fax number into a fax machine), the provision applies.

The provision has a pervasive application within Section 508. A corresponding provision exists in the Web standard, where assistive technology can be installed (Chapter 6, Web-based Information and Applications Accessibility Guidelines, 1194.22 (p)) and also in the telecommunications standard, specifically IVR interactions (Chapter 7, Telecommunications Products, 1194.23 (c)).

9-3.2 Techniques

9-3.2.1 For Kiosks:

- *ITM Kiosk without full PC interface:* For kiosks that have no full PC functionality (e.g., an ATM machine), if the functions of the machine include a timeout, users must be notified when a process is about to time out and must be given an opportunity to answer a prompt asking whether additional time is needed.
- *ITM Kiosk with full PC interface:* Some kiosk implementations are created by placing a PC in a kiosk enclosure. Such implementations pose a challenge in that they provide access to operating system functions, application functions, and Web site access. Refer to provision (a) for details.

9-3.2.2 For Copiers, Printers, Calculators, and Fax Machines:

- *COTS without PC interface:* Refer to provision (a) for details.
- *COTS / non-standard with a PC interface:* For high-end devices that have an interface via a connected PC (either directly attached or on the network), and fax interfaces, insure that the dialog box on the PC follows the appropriate standard in chapter 9.

9-3.2.3 For PDAs:

Refer to provision (a) for details.

9-3.3 Testing

- a. If the device has a timeout, ensure that both a prompt is given and that more time is available.
- b. Performance — For each case of a required response within a time interval does the product meet all of the following criteria:
 - (1) Does the product give an alert (which is accessible) when the time interval is about to run out?
 - (2) Does the product allow the user to indicate that more time is required?
 - (3) Does the product provide sufficient time for the user to indicate that more time is required?
 - (4) Does the product provide additional time as requested?

- c. If an exception was taken when procuring a device that is not fully accessible, define the alternate format or alternate method needed to provide equivalent access to people with disabilities who can not readily use the device.

9-3.4 **References**

The following references apply to the specific requirements stated in this section:

- Trace Center Research on Kiosk accommodation (Note sub-page for unique approach: EZ Access keys)
<http://www.tracecenter.org/world/kiosks/>
- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>

9-4 **Touch Screens or Contact-Sensitive Controls**

Where a product uses touch screens or contact-sensitive controls, an input method must be provided that complies with §1194.23 (k) (1) through (4). (§1194.25, Provision c).

9-4.1 **Rationale**

Touch screens and other controls that operate by sensing a person's touch pose access problems for a range of persons with disabilities. This provision does not prohibit the use of touch screens and contact-sensitive controls, but, as modified, the final rule requires a redundant set of controls that can be used by persons who can not access touch screens.

In some instances, a personal computer with a touch screen will be enclosed in a display and used as an "information kiosk." This provision does not prohibit the use of a kiosk touchscreens, but requires a redundant set of controls that can be used by persons whose vision or mobility prevents interaction with touch screens.

The standard for telecommunications products [§1194.23 (k)] requires that touch screens or contact-sensitive controls comply with these four requirements:

- *Requirement (1)* specifies that individual keys be locatable and distinguishable from the product surface and adjacent keys by touch. This provision applies only to products that have mechanically operated controls or keys, such as ATM/ITM keypads and device keyboards. However, since all devices need to meet the Functional Performance Criteria described in Section 4-2.1, Specific Standards and Functional Performance Criteria, products that incorporate touch screens or contact-sensitive controls are able to meet these criteria only if an alternative way of operating them using tactilely discernable controls is provided. For example, PDAs with telephone functionality and touch

screens and desk telephones with touch-screen enhanced features that cannot be operated via tactile controls would come under this provision.

- *Requirement (2)* specifies that controls and keys must be operable with one hand and that they must not require tight grasping, pinching, or twisting of the wrist. Individuals with tremor, cerebral palsy, or other disabilities may have difficulty operating systems that require fine motor control, a steady hand, or the use of both hands simultaneously for operation. Individuals with high spinal-cord injuries, arthritis, and other conditions may have difficulty operating controls that require significant strength. The requirement's force limit (5 pounds) is based on section 4.27.4 of the ADA Accessibility Guidelines.
- *Requirement (3)* requires that if key repeat is supported, the delay before repeat must be adjustable to at least 2 seconds. Key repeat rate must be adjustable to 2 seconds per character. This requirement addresses a challenge encountered by some people without fine motor coordination. Sometimes, they accidentally don't release a key fast enough and get several (auto-repeated) characters when they only intended to type one (because the key repeat was faster than they can move). This could potentially result in the same character displaying several times on the screen. It could also result in the same function repeating (e.g., sending the same fax multiple times.). The "key repeat" requirement applies only to controls that have a "key repeat" function.
- *Requirement (4)* specifies that the status of all locking or toggle controls or keys (e.g., "caps lock", "scroll lock", etc.) must be visually discernible, and discernible either through touch or sound. For example, adding audio patterns, such as ascending and descending pitch tones that indicate when a control is turned on or off, would alleviate the problem of a person who is blind inadvertently pressing the locking or toggle controls. Buttons that remain depressed when activated and switches with distinct positions may also meet this provision.

It should be noted that the rationale for physical access is also repeated in the desktop and portable computer standard discussed in Chapter 10, Desktop and Portable Computers, of this handbook.

9-4.2 Techniques

9-4.2.1 For Kiosks:

- *ITM Kiosk without full PC interface:* For kiosks that have no full PC functionality (e.g., an ATM), if a touch screen is used, an accessible set of controls also must be provided.
- *ITM Kiosk with full PC interface:* Some kiosk implementations are created by placing a PC in a kiosk enclosure. Such implementations pose a challenge in that they provide access to operating system functions, application functions, and Web site access. See section 9-2 above for details.

9-4.2.2 **For Copiers, Printers, Calculators, and Fax Machines:**

- *COTS without PC interface:* For simple devices that have no interface via a connected PC (either directly attached or on the network), all functions must be controllable by controls and keys that are tactilely discernable. Refer to Section 7-12, Controls and Keys.
- *COTS / non-standard with a PC interface:* For high-end devices that have an interface via a connected PC (either directly attached or on the network), refer to section 9-2 above for details.

9-4.2.3 **For PDAs:**

- *For PDAs that are closed systems:* Despite the difficulty of finding compliant devices in this category, many PDAs have touch screens and are thus governed by this provision. Some PDAs provide for the installation of a full keyboard as an alternate method of input.
- *For PDAs that have operating systems:* Refer to section 9-2 above for details.

9-4.3 **Testing**

- a. Inspect the product to identify if the device provides a function allowing access as specified in terms of operation with limited vision, hearing, or mobility.
- b. Operate all functions of the device without contact with the touch screen, performing the following tests.
 - (1) Evaluate a prototype with accessibility experts.
 - (2) Evaluate functions with an experienced user.
 - (3) Evaluate functions with a novice user.
- c. If the text on the screen has an equivalent audio channel that communicates the text in a spoken form, turn off the screen, use a headset, and operate all functions of the device.
- d. If an exception was taken when procuring a device that is not fully accessible, define the alternate format or alternate method needed to provide equivalent access to people with disabilities who can not readily use the device.
- e. If the touch screen functions can be emulated by an attached PC, investigate control from a personal computer as an alternate mode of operation.

9-4.4 **References**

The following references are applicable to the specific requirements stated here:

- Trace Center Research on Kiosk accommodation (Note sub-page for unique approach: EZ Access keys)
<http://www.tracecenter.org/world/kiosks/>

- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>
- Tiresias – International Information on Visual Disability, guidelines for tactile identifiers on keys
<http://www.tiresias.org/guidelines/keys.htm>
- Enable Tech: Tools to Consider – Keyboards
<http://www.enabletech.ie/Tools2.html>
- Section 4.27.4 of the ADA Accessibility Guidelines (ADAAG), codified as the ADA Standards for Accessible Design as part of the Department of Justice’s regulation implementing title III of the ADA at 28 C.F.R. pt. 36, Appendix A Telecommunications Act Accessibility Guidelines
<http://www.access-board.gov/adaag/html/adaag.htm#4.27>
- Trace Research Center, University of Wisconsin, “Ergonomics of a Non-Visual Touchscreen Interface: A Case Study.”
http://trace.wisc.edu/docs/touchscreen_ergonomics2000/ergonomics.htm
This document provides information on touch screen interfaces for people who are blind or visually impaired.

9-5 Biometric Forms of User Identification or Control

When biometric forms of user identification or control are used, an alternative form of identification or activation that does not require the user to possess particular biological characteristics, must also be provided. (§1194.25, Provision d).

9-5.1 **Rationale**

Biometric controls refer to controls that are activated only if a particular biological feature of the end user exists and matches specific criteria (e.g., voiceprint, fingerprint, or retinal image).

Biometric controls are becoming more common, because they can provide a high level of security or offer increased efficiencies in user interaction with computer systems. Biometric controls are used for two primary purposes: security (i.e., user identification and authentication) and non-security commands or user input. One example is a high-security computer system or information transaction machine that uses retinal scanners or fingerprint identification controls to identify users before providing them access to personal or sensitive data. Another example is a portable computer that offers an optional voice command feature to allow the user access to various applications or data stored on the computer. In the latter example, the voice commands are a benefit because they help the user make selections or provide input more quickly or in a “hands-free” mode.

While biometric controls offer many benefits, they can present significant barriers to people with various disabilities. This requirement addresses this problem by requiring that when biometric controls are used, an alternate

access method must be provided that does not compromise security and that does not require specific biological features (e.g., voiceprint, fingerprint, retinal scan) to activate or operate the controls.

Note: This provision is also part of the desktop and portable computer standard discussed in chapter 10 of this handbook.

9-5.2 Techniques

According to the Architectural and Transportation Barriers Compliance board, “The provision does not require a specific alternative. That selection is left up to the agency, which may choose a less expensive form of identification” (36 CFR Part 1194).

Some potential alternatives include the following:

- A shared desktop computer located in a plant management office uses a fingerprint scanner to provide secure access to highly confidential files for a select group of Postal Service employees. As an alternative to the fingerprint scan, the system provides an alternate access method by allowing the user to enter a password and answer some additional verification questions. This alternative access method is also beneficial for all users, either as a redundant check or in situations where the primary method is inadequate (e.g., when the fingerprint scanner ceases to work properly, or when users have a temporary disability such as a broken hand that is in a cast).
- A portable computer uses voice commands to allow users to activate key applications such as a contact database or calendar. As an alternative to the voice commands, the user can enter input using the computer keyboard.

9-5.3 Testing

- a. Inspect the product to identify if the biometric control provides a function allowing access as specified in terms of operation with limited vision, hearing, or mobility.
- b. If an exception was taken when procuring a device that is not fully accessible, define the alternate format or alternate method needed to provide equivalent access to people with disabilities who can not readily use the device.

9-5.4 References

The following references apply to the specific requirements stated in this section:

- Biometrics Resource Center Website at the National Institute for Standards and Technology
<http://www.itl.nist.gov/div895/biometrics>
- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>

- Open Directory Project: Biometrics Links
<http://dmoz.org/Computers/Security/Biometrics/>

9-6 Auditory Output

When products provide auditory output, the audio signal must be provided at a standard signal level through an industry standard connector that will allow for private listening. The product must provide the ability to interrupt, pause, and restart the audio at anytime. (§1194.25, Provision e).

9-6.1 Rationale

This provision requires that when products use audio as a way to communicate information, the auditory signal must be available through an industry standard connector at a standard signal level. Individuals using personal headsets or similar audio-processing devices need a place to plug these devices into the product in a standard fashion. This gives the user the ability to listen privately to an audio presentation of information that is also presented visually. The product must also provide a method to pause, restart, and interrupt the flow of audio information.

The classic instance of this provision is the use of ATMs by blind people. If an ATM provides an audio rendition of the screen contents, instructions on how to turn on, pause, interrupt, and restart the audio must also be provided. This provision applies only to voice output. It does not require an audio output for devices that emit only “beeps and tones.”

People who regularly use information transaction kiosks and require audio rather than visual output generally carry a portable headset (or other listening coupler) with them. Examples of common plugs on headsets include 3.5 mm plugs (the *de facto* standard in kiosks and used in most portable stereos), and 2.5 mm jacks (used in most cellular phones).

According to the Occupational Safety and Health Administration, and the American Speech, Language, and Hearing Association, 65 dB is the volume level for normal speech (see sections 7-7 and 7-8 of this handbook).

Products that provide auditory output must have a feature that automatically resets the volume to the default level after every use. This is consistent with the similar provision addressing telecommunications products.

9-6.2 Techniques

9-6.2.1 For Kiosks:

- *ITM Kiosk without full PC interface:* Kiosks that have no full PC functionality (e.g., an ATM) require an audio equivalent to screen output.
- *ITM Kiosk with full PC interface:* See section 9-2.2.1 of this handbook for details.

9-6.2.2 For Copiers, Printers, Calculators, and Fax Machines

- *COTS without PC interface:* For simple devices that have no interface via a connected PC (either directly attached or on the network), audio output is not yet a standard feature.
- *COTS / non-standard with a PC interface:* See section 9-2.2.2 of this handbook for details.

9-6.2.3 For PDAs:

See section 9-2.2.3 of this handbook for details.

9-6.3 Testing

- a. Inspect the product to identify if the device provides a function allowing access as specified in terms of operation with limited vision, hearing, or mobility.
- b. As presently defined, this provision covers self-contained devices for which the output needs to be expressed as speech to an end user with a headset. Testing, therefore, is best done by operating the system with the screen turned off and headsets used as the output mode. Error conditions and introductory text prompts should also be clear.
- c. If an exception was taken when procuring a device that is not fully accessible, define the alternate format or method needed to provide equivalent access to people with disabilities who can not readily use the device.

9-6.4 References

The following references apply to the specific requirements stated in this section:

- Trace Center Research on Kiosk accommodation (Note sub-page for unique approach: EZ Access keys)
<http://www.tracecenter.org/world/kiosks/>
- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>

9-7 Voice Output in a Public Area

When products deliver voice output in a public area, incremental volume control must be provided with output amplification up to a level of at least 65 dB. Where the ambient noise level of the environment is above 45 dB, a volume gain of at least 20 dB above the ambient level must be user selectable. A function must be provided to automatically reset the volume to the default level after every use (§1194.25, Provision f).

9-7.1 Rationale

People who are hard of hearing, generally speaking, can understand speech only if voice levels are 20 dB above the ambient sound level. This means that as long as the noise level in the surrounding environment is below 45 dB, a 65 dB output level would be sufficient. To comply with this position, a Postal Service engineer (or other appropriate responsible party) must determine the volume of background noise at the location of the machine (specifically whether it is above 45 dB), so that the machine can be selected or calibrated for that specific environment. To comply with this provision, consideration needs to be given to the fact that ambient noise levels may vary in certain environments.

9-7.2 Techniques

This provision is an engineering specification rather than a performance standard. Therefore, the technique is to insure that the specification is met.

9-7.3 Testing

- a. Verify that the voice output is appropriate to the ambient noise level.
- b. Insure that the audio is adjustable, and that the accessible controls are clearly marked.
- c. Verify that the product automatically resets the volume to the default level after every use.
- d. If an exception was taken when procuring a device that is not fully accessible, define the alternate format or alternate method needed to provide equivalent access to people with disabilities who can not readily use the device.

9-7.4 References

The following references are applicable to the specific requirements stated here:

- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>
- Voting Systems Standards, April 30, 2002, Federal Election Commission (FEC)
<http://www.fec.gov/pages/vssfina/vss.html>

9-8 Color Coding

Color coding must not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. (§1194.25, Provision g).

9-8.1 Rationale

This provision defines a requirement for self-contained devices with color displays and keys/buttons in which color indicates meaning. Any display that requires a user to distinguish among otherwise identical red and blue objects for different functions (e.g., printing a document or saving a file) would pose problems for anyone who is color blind. Displays must, therefore, not rely on color as the sole indicator of meaning for a visual element. (See Section 5-10, Software Applications and Operating Systems: Color Coding.)

This provision does not prohibit the use of color to enhance identification of important features. It does, however, require that some other method of identification, such as text labels, be combined with the use of color whenever a visual object conveys information.

9-8.2 Techniques

Purchased products should be the most compliant available; developed products must be compliant. If color displays are developed by the Postal Service, they must meet all provisions.

Self-contained, closed products must not use color alone to convey information, indicate an action, prompt a response, or distinguish an important visual event. For example, do not instruct a user to “select the blue icon from the list.”

Instead, instruct the user without referring to color alone. If color is used, provide an accessible alternate format or method, such as a textual label or text formatting, to convey the equivalent information (e.g., use color and boldface text to indicate highlighted information).

9-8.3 Testing

- a. Inspect the product to determine whether it follows the convention of object identification that uses color as only one of the distinguishing features.
- b. If an exception was taken when procuring a device that is not fully accessible, define the alternate format or alternate method needed to provide equivalent access to people with disabilities who can not readily use the device.

9-8.4 **References**

The following references apply to the specific requirements listed in this section:

- Web/Computer Color Chart for the Color Blind
<http://www.toledo-bend.com/colorblind/colortable.html>
- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>

9-9 **Range Of Color Selections**

When a product permits a user to adjust color and contrast settings, a range of color selections capable of producing a variety of contrast levels must be provided (§1194.25, Provision h).

9-9.1 **Rationale**

This provision applies to those products that already allow a user to adjust screen colors and contrast.

This provision requires more than just providing color choices. When shades of gray (black and white contrast) are available, this provision also applies. The available choices must also allow for different levels of contrast. Many people experience a high degree of sensitivity to bright displays. People with this condition cannot focus on a bright screen for long because they will soon be unable to distinguish individual letters. An overly bright background causes a visual “white-out.” To alleviate this problem, the user must be able to select a softer background and appropriate foreground colors. On the other hand, many visually impaired people can work most efficiently when the screen is set with very sharp contrast settings. Because individual needs vary so much, a program must have a variety of color and contrast settings. (See Section 5-8, Software Applications and Operating Systems: User-Selected Display Attributes, Color, and Contrast.)

9-9.2 **Techniques**

Purchased products should be the most compliant available; developed products must be compliant. If color displays are developed by the Postal Service, they must meet all provisions.

Self-contained, closed products, when they provide contrast adjustments, must provide a full range of adjustment.

9-9.3 Testing

- a. Inspect the product to determine whether it follows the convention of appropriate contrast adjustment.
- b. If an exception was taken when procuring a device that is not fully accessible, define the alternate format or alternate method needed to provide equivalent access to people with disabilities who can not readily use the device.

9-9.4 References

The following references are applicable to the specific requirements stated here:

- Web/Computer Color Chart for the Color Blind
<http://www.toledo-bend.com/colorblind/colortable.html>
- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>

9-10 Screen Flickering

Products must be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz. (§1194.25, Provision i).

9-10.1 Rationale

This requirement is specified because some individuals with photosensitive epilepsy can have a seizure triggered by displays that flicker or flash, particularly if the flash has a high intensity and is within certain frequency ranges. The 2 Hz limit was chosen to be consistent with proposed revisions to the ADA Accessibility Guidelines which, in turn, are being harmonized with the International Code Council (ICC)/ANSI A117 standard, "Accessible and Usable Buildings and Facilities", ICC/ANSI A117.1-1998, which refers to a 2 Hz limit. An upper limit was identified at 55 Hz. See Section 5-11, Software Applications and Operating Systems: Video Frequency.

9-10.2 Techniques

Purchased products should be the most compliant available; developed products must be compliant. If displays contain elements that flicker, they must adhere to the specification of this provision.

9-10.3 Testing

- a. Search for flashing or blinking text, objects, or other user interface elements. Also, search for elements that employ a quick change from dark to light (similar to strobe lights).

- b. Use an electronic tester (i.e., screen calibrator) or a software test feature to determine the time interval between flashes for all blinking or flashing user interface elements.
- c. If any flashing or blinking objects cannot be tested, they will need to be omitted from the software application altogether.
- d. Adjust or fix any flashing or blinking elements that have an unacceptable Hertz range or that have a high level of contrast between states. Ensure that flashing areas of the screen are kept to as small an area as possible.
- e. For all blinking or flashing elements that are included, a method must also be offered that allows users to change the elements' flash rate or disable them altogether.

9-10.4 **References**

The following references are applicable to the specific requirements stated here:

- Epilepsy Action: Photosensitive Epilepsy
<http://www.epilepsy.org.uk/info/photo.html>
- International Code Council (ICC)/ANSI A117 standard, "Accessible and Usable Buildings and Facilities," ICC/ANSI A117.1-199
<http://www.iccsafe.org/dyn/prod/9033S98.html>
- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>

9-11 Operable Controls on Freestanding, Non-Portable Devices

Products which are freestanding, nonportable, and intended to be used in one location and which have operable controls must comply with the following:

- a. The position of any operable control must be determined with respect to a vertical plane, which is 48 inches in length, centered on the operable control, and at the maximum protrusion of the product within the 48-inch length (see Figure A of this part).
- b. Where any operable control is 10 inches or less behind the reference plane, the height must be 54 inches maximum and 15 inches minimum above the floor.
- c. Where any operable control is more than 10 inches and not more than 24 inches behind the reference plane, the height must be 46 inches maximum and 15 inches minimum above the floor.
- d. Operable controls must not be more than 24 inches behind the reference plane (see Figure B of this part).

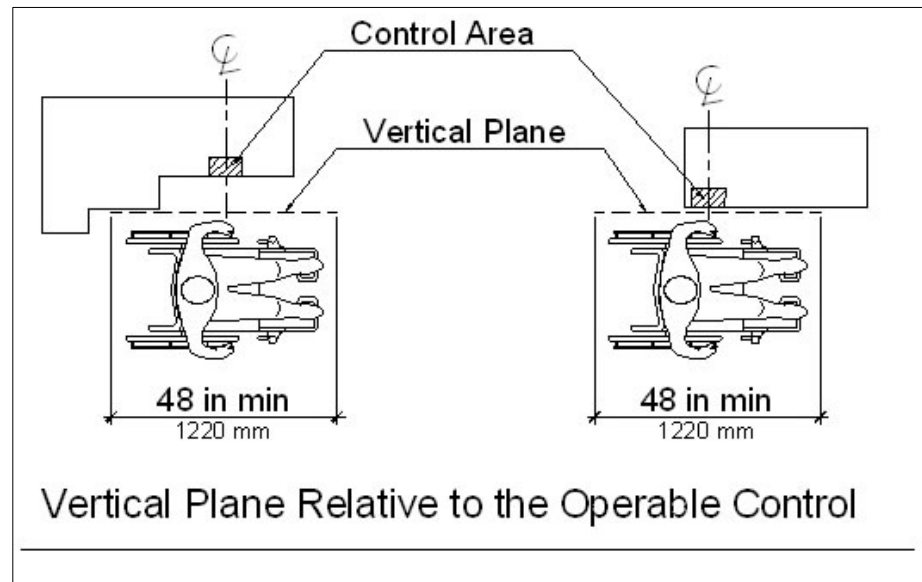
Figure A

Figure A above illustrates two bird's-eye views of the Vertical Plane Relative to Operable Control. In both views, the vertical plane is centered on the control area. In the first view, the vertical plane is set back from the control area by a protrusion on the device. In the second view, there are no protrusions on the device and the vertical plane is right up against the control area.

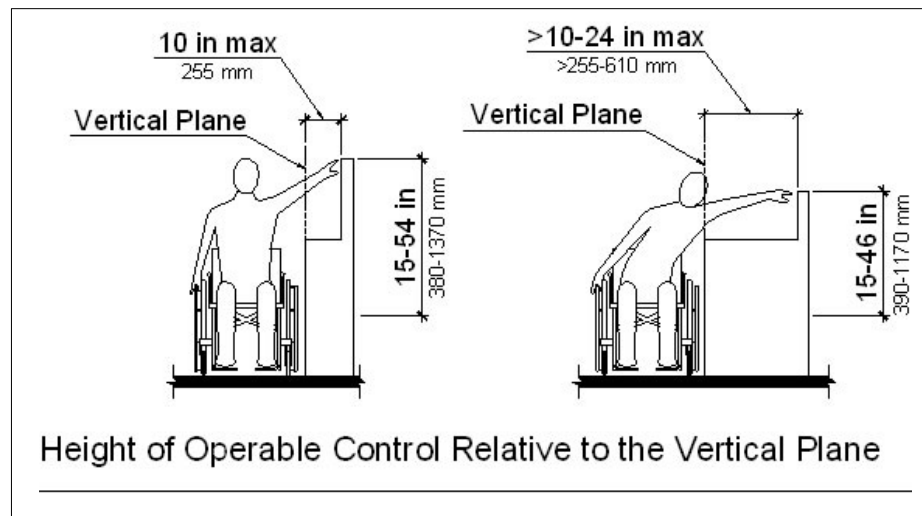
Figure B

Figure B above illustrates two front views of Height of Operable Control Relative to a Vertical Plane. The first view illustrates a reach of no more than 10 inches deep with the control area between 15 and 54 inches. The second view illustrates a reach greater than 10 inches but not more than 24 inches deep with the control area between 15 and 46 inches.

(§1194.25, Provision j).

9-11.1 **Rationale**

Provisions 1–4 above apply to the physical characteristics of large office equipment, including reach ranges and the general physical accessibility of controls and features. Examples of these products include, but are not limited to, copiers, information kiosks, and floor-standing printers. These provisions are based on the Americans with Disabilities Act Accessibility Guidelines (ADAAG 4.2 Space Allowance and Reach Ranges).

Some examples may clarify the applicable standards:

- If a document feeder is built within the technical specifications, but access to the platen glass is outside the reach range, a copier would *not* be in compliance with this provision. Users need to be able to access both the paper feed and the platen glass. Some documents are too small or too large to be run through a paper feed.
- If copier paper trays are not reachable, on the other hand, the copier may still be compliant, because replacing paper is considered to be a maintenance function, not a normal daily operation. Operable controls include, but are not limited to, mechanically operated controls, input and output trays, card slots, keyboards, or key pads. The standards apply to products in their normal operation rather than to maintenance, repair, or occasional monitoring. Other tasks, such as initial setup and configuration, adding and replacing parts, and repair and service tasks are also not covered by the standards.

9-11.2 **Techniques**

Purchased products should be the most compliant available; developed products must be compliant. If kiosks are developed by the Postal Service, they must meet all provisions.

This provision is essentially an objective specification. Figures are given in appendix 9-A.

9-11.3 **Testing**

- a. Inspect the product to identify its measurements.
- b. If an exception was taken when procuring a device that is not fully accessible, define the alternate method needed to provide equivalent access to people with disabilities who can not readily use the device.

9-11.4 References

The following references are applicable to the specific requirements stated here:

- ADAAG 4.2 Space Allowance and Reach Ranges
http://www.adaportal.org/Facility_Access/ADAAG/Appendix/ADAAG_Appendix_4-2.html
- Guide to the Section 508 Standards for Electronic and Information Technology, Self-Contained, Closed Products (1194.25)
<http://www.access-board.gov/sec508/guide/1194.25.htm>

Appendix 9-A

Self-Contained, Closed Products Accessibility Questions

Products that are freestanding, nonportable, and intended to be used in one location and that have operable controls must comply with the following:

| | Standard | Questions to Ask | Notes |
|-----|--|--|-------|
| | <i>Subpart B-Technical Standards 1194.25 Self contained, closed products</i> | | |
| (a) | Self contained products must be usable by people with disabilities without requiring an end user to attach assistive technology to the product. Personal headsets for private listening are not assistive technology. | 1. Is the product able to be used by someone with a vision, hearing, mobility (including dexterity), or speech disability without the use of AT? | |
| (b) | When a timed response is required, the user must be alerted and given sufficient time to indicate more time is required. | 2. Do any of the product's functions include a "time-out"? If so, does the product alert the user and provide enough time to request more time? 3. Is the alert given in both visual and audio formats? | |
| (c) | Where a product uses touch screens or contact-sensitive controls, an input method must be provided that complies with §1194.23 (k) (1) through (4). | 4. Does the product require the user to touch the screen or another component that responds to touch? 5. Is there a keypad? If so, ensure that it complies with the standards listed in the telecommunications section. | |
| (d) | When biometric forms of user identification or control are used, an alternative form of identification or activation, which does not require the user to possess particular biological characteristics, must also be provided. | 6. Does the product require input using a specific biological feature (e.g., retina, voice, fingerprint)? 7. Does the product offer a secondary method of input that does not require a particular biological feature? | |
| (e) | When products provide auditory output, the audio signal must be provided at a standard signal level through an industry standard connector that will allow for private listening. The product must provide the ability to interrupt, pause, and restart the audio at any time. | 8. Does the product produce audio output? 9. Is there a standard port to attach headsets? 10. Can you start, stop, and pause the audio? | |

| | Standard | Questions to Ask | Notes |
|--|---|---|-------|
| (f) | When products deliver voice output in a public area, incremental volume control must be provided with output amplification up to a level of at least 65 dB. Where the ambient noise level of the environment is above 45 dB, a volume gain of at least 20 dB above the ambient level must be user selectable. A function must be provided to automatically reset the volume to the default level after every use. | 11. Does the product have voice output (i.e., other than beeps)? 12. Can you adjust the volume to at least 65 dB? 13. If the ambient noise exceeds 45 dB, can you adjust the volume to at least 20 dB louder than the environment? 14. When you finish using the product, does the product automatically reset the audio to a default level? | |
| (g) | Color coding must not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. | 15. Whenever an element such as a control is distinguished by a color, is another method (e.g., text label) used to denote the element? | |
| (h) | When a product permits a user to adjust color and contrast settings, a range of color selections capable of producing a variety of contrast levels must be provided. | 16. Does the product allow users to set color and/or contrast settings? If so, are several options provided? | |
| (i) | Products must be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz. | 17. Is there any blinking text or graphics in the program? If so, verify that it falls within the accepted frequency range. | |
| (j) | Products which are freestanding, nonportable, and intended to be used in one location and which have operable controls must comply with the following: (1) The position of any operable control must be determined with respect to a vertical plane, which is 48 inches in length, centered on the operable control, and at the maximum protrusion of the product within the 48 inch length (see section 9-11, Figure A). (2) Where any operable control is 10 inches or less behind the reference plane, the height must be 54 inches maximum and 15 inches minimum above the floor. (3) Where any operable control is more than 10 inches and not more than 24 inches behind the reference plane, the height must be 46 inches maximum and 15 inches minimum above the floor. (4) Operable controls must not be more than 24 inches behind the reference plane (see section 9-11, Figure B). | 18. Is the product freestanding (i.e., not placed on a stand or table)? 19. Are all controls placed within an acceptable reach range? | |
| <i>Subpart C-Functional Performance Criteria</i> | | | |
| (a) | Is at least one mode of operation and information retrieval provided that does not require user vision? | Review comments for Subpart B, standards (b), (c), (d), (g), and (h). | |
| (b) | Is at least one mode of operation and information retrieval that does not require visual acuity greater than 20/70 provided in audio and enlarged print output working together or independently? | 20. Does the product require a user to use an input method other than a keyboard or view a monitor? 21. Does any of the product's features require a user to view small text and/or graphics? | |

| | Standard | Questions to Ask | Notes |
|--|---|--|--------------|
| (c) | Is at least one mode of operation and information retrieval provided that does not require user hearing? | Review comments for Subpart B, standards (b), (d), (e), and (f). | |
| (d) | Where audio information is important for the use of the product, is at least one mode of operation and information retrieval provided in an enhanced auditory fashion? | 22. Does the product incorporate any audio or video (e.g., tutorial or help files)? 23. If so, is an alternate output provided (e.g., a text script or captions)? 24. Does the application use error tones? If so, are text messages associated with each error? | |
| (e) | Is at least one mode of operation and information retrieval provided that does not require user speech? | Review comments for Subpart B, standard (d). 25. Does any part of the application require speech input or recognition? | |
| (f) | Is at least one mode of operation and information retrieval provided that does not require fine motor control or simultaneous actions and that is operable with limited reach and strength? | Review comments for Subpart (B), standards (b), (c), and (j). | |
| <i>Subpart D-Information, Documentation, and Support</i> | | | |
| (a) | Product support documentation provided to end users must be made available in alternate formats upon request, at no additional charge. | 26. Does the program come with documentation that is accessible to persons with disabilities? | |
| (b) | End users must have access to a description of the accessibility and compatibility features of products in alternate formats or alternate methods upon request, at no additional charge. | 27. Can the vendor provide a description of accessibility features (e.g., the VPAT)? | |

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10 Desktop and Portable Computers

10-1 Overview

10-1.1 Contents

This chapter contains the specific electronic and information technology (EIT) performance requirements related to the following subpart of Section 508:

EIT Technical Standard 1194.26, Desktop and Portable Computers, Provisions (a) thru (d).

10-1.2 Summary

10-1.2.1 Technology

The requirements in this chapter cover the following:

- Any hardware computer product, regardless of type (e.g., desktop, mobile, or portable), onto which operating systems and software applications can be installed.
- For products with multiple functions, these requirements apply only to the hardware components of those products. The proliferation of computer hardware devices is blurring the line between different product types as a variety of new and innovative products are created.

Note: You may need to synchronize general and specific requirements in this chapter with requirements given in other chapters in this handbook. Products that are classified as desktop, mobile, or portable/handheld computers are subject to the requirements stated in this chapter. However, products often have features that may be covered in other technical chapters (i.e., chapters 5–10) as well as the Functional Performance Criteria described in section 4-2.1. A few examples of how to determine which requirements apply are shown below:

- A PDA that provides telephone functions is subject to the requirements in this chapter and the telecommunications requirements in chapter 7.
- A handheld computer used by a Postal Service delivery carrier is considered to be a closed system (i.e., it is used for a few specific functions) and the user cannot install additional hardware and software on it. In this case, the device would be subject only to Chapter 9: Self-Contained, Closed Products, not the requirements in this chapter.

10-1.2.2 **Audience**

This chapter applies to anyone who buys or develops desktop, mobile, or portable computer hardware products for the Postal Service (i.e., Postal Service employees, suppliers, contractors, and business partners). Desktop, mobile and portable computer products range from traditional desktop computers to portable tablet computers and PDAs.

10-1.3 **Structure and Use**

Each part of this chapter describes the specific requirements that support one or more provisions in the technical standards for desktop and portable computers. The technical standards of Section 508 were written primarily from a technology perspective. The Postal Service may consolidate some provisions to help Postal Service employees and business partners understand Postal Service compliance requirements from the perspective of designing for accessibility. Each specific requirement includes a rationale, techniques, testing methods, and references as shown below in section 10-2.

10-1, Overview

10-2, Mechanical or Touch-Operated Controls, Keys, and Touch Screens (Provisions §1194.26a and §1194.26b)

- Rationale
- Techniques
- Testing
- References

10-3, Biometric User Identification and Controls (Provision §1194.26c)

10-4, Industry-Standard Expansion Slots, Ports and Connectors (Provision §1194.26d)

Appendix 10-A, Checklist

10-1.4 **Introduction to Desktop and Portable Computer Accessibility**

While looking at desktop and portable computer barriers, it is helpful to understand the challenges that people with various disabilities face in using computers covered by the requirements in this chapter. The need for a solution to these challenges resulted in the development of specific desktop and portable product accessibility standards in Section 508. These challenges vary by type of physical impairment:

- People who are deaf or who have hearing impairments are typically faced with challenges such as:
 - Lack of visual counterparts for audio features, including various sounds and spoken text.
 - Lack of visual or tactile status indicators for locking or toggle controls or keys.

- People who are blind or who have visual impairments are typically faced with challenges such as:
 - Lack of tactile identifiers that help them locate, identify and use keys and controls used for input and operation of a computer product.
 - Lack of tactile or audio-based status indicators for locking or toggle controls or keys.
 - Lack of alternative input methods for interaction with touchscreen interfaces.
- Dexterity or mobility-impaired persons are typically faced with challenges such as:
 - Inaccessible computer keys and controls, including ones that require tight grasping, pinching, or twisting.
 - Lack of adjustable key repeat features.
 - Lack of visual, tactile, or audio-based status indicators for locking or toggle controls or keys.
 - Keys, controls, and switches.
 - Lack of error recovery features.
 - Reliance on voice or manual input.

10-1.5 **Testing for Compliance**

When testing desktop and portable computer products for compliance, it is crucial to be aware of the end user environment. This includes an understanding of product's stated accessibility features, in addition to methods the products uses for input and output.

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by assistive technology users. Automated testing tools or integrated development environment (IDE) features may help automate these methods, but automated testing must be accompanied by manual testing.

10-2 Mechanical or Touch-Operated Controls, Keys, and Touch Screens

Desktop and portable computer products that have mechanically operated controls and keys must comply with the following requirements:

- a. Controls and keys must be tactilely discernible without activating the controls or keys;
- b. Controls and keys must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys must be 5 lbs. (22.2 N) maximum;
- c. If key repeat is supported, the delay before repeat must be adjustable to at least 2 seconds. Key repeat rate must be adjustable to 2 seconds per character; and
- d. The status of all locking or toggle controls or keys must be visually discernible, and discernible either through touch or sound.
- e. For touchscreens, provide an appropriate alternate access method that supports requirements a.–d. shown above.

10-2.1 Rationale

These provisions apply to user-operable controls, which are components of a product that are operated by physical contact. Typically, the control panel or user interface, and their major components, buttons, keys, and knobs, are the primary items of concern. However, mechanically operated controls such as latches are also covered — as long as they require contact for “normal operation.” Examples of normal operation would include selecting features, ejecting a CD-ROM, and pressing keys. Operable controls required for maintenance, service, repair, installation, and configuration or occasional monitoring are not covered by this provision. An example would be an RJ-11 plug that may be connected into a jack only one time.

Requirement 1 states that individual keys be locatable and distinguishable from the product surface and adjacent keys by touch. This provision only applies to products that have mechanically operated controls or keys, such as standard telephone keypads and computer keyboards. It is not intended to apply to touchscreens. Touchscreens and other contact sensitive controls are not specifically prohibited by any of the Telecommunications Product provisions. However, since all devices need to meet the functional performance criteria described in section 4-2.1, products that incorporate touchscreens or contact-sensitive controls are only able to meet these criteria if an alternative way of operating them using tactilely discernible controls was provided. At this time, some desktop and portable computer products with touchscreens and other contact sensitive controls do not conform with this provision. For example, there are PDAs with telephone functionality and touchscreens, as well as desk telephones with touchscreen enhanced features that cannot be operated via tactile controls.

Requirement 2 states that controls and keys must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys must be 5 lbs. (22.2 N) maximum. Individuals with tremor, cerebral palsy, or other disabilities may have difficulty operating systems which require fine motor control, a steady hand, or two hands to be used simultaneously for operation. Individuals with high spinal cord injuries, arthritis, and other conditions may have difficulty operating controls which require significant strength. The provision limits the force required to five pounds and is based on section 4.27.4 of the ADA Accessibility Guidelines. This provision is also consistent with the Telecommunications Act Accessibility Guidelines.

Requirement 3 states that if key repeat is supported, the delay before repeat must be adjustable to at least 2 seconds. Key repeat rate must be adjustable to 2 seconds per character. This requirement addresses a challenge encountered by some people without fine motor coordination. Sometimes they accidentally don't release a key fast enough and get several (auto-repeated) characters when they only intended to type 1 (because the key repeat was faster than they can move). This could potentially result in the same character displaying several times on the screen. It could also result in the same function repeating (e.g., causing the telephone volume to get too high.). The "key repeat" requirement only applies to controls that have a "key repeat" function.

Requirement 4 states that the status of all locking or toggle controls or keys (e.g., "caps lock," "scroll lock," etc.) must be visually discernible, and discernible either through touch or sound. For example, adding audio patterns, such as ascending and descending pitch tones that indicate when a control is turned on or off, would alleviate the problem of a person who is blind inadvertently pressing the locking or toggle controls. Also, buttons which remain depressed when activated and switches with distinct positions may meet this provision.

Requirement 5 addresses the specific challenges of touchscreen interfaces. Touchscreens or contact-sensitive controls often provide no tactile cues so they require the user to be able to see the areas of the screen in order to activate a touch control. People with visual impairments cannot locate the areas of the touchscreen to activate the controls. In addition, since touch-operated controls often require physical body contact, people with various disabilities may not be able to operate the control.

10-2.2 **Techniques**

10-2.2.1 **Ensure That Users Can Locate Keys By Touch Without Activating Them**

Ensure that individual keys are tactilely discernable without activating the controls or keys.

"Tactilely discernable" means that the keys are locatable and distinguishable from the product surface and adjacent keys by touch through use of various shapes, spacing, or tactile markings. The normal desktop computer

keyboard, for example, would meet this provision because the tactile marks on the “j” and “f” keys permit a user to locate all other keys tactilely from these landmarks and the edges of the keyboard. In addition, the physical spacing of the function, “num pad” and cursor keys make them easy to locate by touch. Many telephones also have a raised dot on the number 5 button, enabling them to orient their fingers around the 12 keys. Because touch is necessary to discern tactile features, this provision requires keyboards to allow exploration by touch that will not automatically activate a function based on mere contact. Fortunately, most keyboards require some pressure on individual keys in order to enable a keystroke. Therefore, “capacitance” keyboards would not meet this provision because they react as soon as they are touched and have no raised marks or actual keys. They may not react at all when touched by a person with a prosthesis. A “membrane” keypad with keys that must be pressed can be made tactilely discernible by separating keys with raised ridges so that individual keys can be distinguished by touch. At this time, some telecommunications products with touchscreens and other contact sensitive controls do not conform with this provision. For example, there are PDAs with telephone functionality and touchscreens, as well as desk telephones with touchscreen enhanced features that cannot be operated via tactile controls. Every attempt should be made to acquire technology that can comply with this requirement where possible and practical. Consider the following recommendations that support this requirement:

- Consider placing tactile marks on top of the keys, not beside them, and raising the marks a minimum of 0.5 mm.
- On numeric keypads, the “5” key could have a tactile marker, such as a “nib” or “bar”, on the top surface of it.
- On QWERTY keyboards, the “F” and “J” keys could have a raised bar on them.
- Recessed keys or keys with concave tops can be an aid to users operating them with a mouth stick or head stick. Raised keys aid users with visual disabilities to locate keys.
- To help people with fine motor control problems, a key guard or overlay option (i.e., membrane) could be provided when practical.
- Making other important keys tactilely distinct (shape, size, spacing, tactile markings) can make them easier to remember and find.

10-2.2.2 **Ensure That All Controls and Keys are Easy to Use**

Ensure that all controls and keys can be activated with one hand using a maximum force of 5 lbs (22.2 N), and do not require tight grasping, pinching or twisting of the wrist.

Adhere to the following recommendations that support this requirement:

- Just as simultaneous two-handed operation is prohibited, multiple fingers, and simultaneous operations of all types should be avoided and are prohibited by section 7-6, which prohibits simultaneous actions and applies to all products.

- Using controls and latches which require light pressure to operate, such as push buttons, up/down control buttons, instead of side to side control buttons, concave rocker switches, or sliding controls would make it easier for users with different types of physical disabilities.
- It is recommended to avoid using controls that must be held down for a period of time if the period exceeds 5 seconds and there is no other way to achieve the function. The provision specifically states that keys and controls must not require twisting. However, this does not mean that rotary knobs cannot be used. If the knobs can be operated within the 22.2 N force limit and without requiring the user to twist, pinch or tightly grasp, then they would conform. Many knobs that have a reasonable surface coefficient of friction and which turn without great effort would meet the requirements of this provision. It is important to keep in mind that sufficient room should be provided around the knobs if they are to be operated in this fashion (e.g., with the side of the hand).

10-2.2.3 **Key Repeat Must Be Adjustable**

If key repeat is supported, the delay before repeat must be adjustable to a rate of at least 2 seconds per character.

When key repeat is supported, adhere to the following recommendations that support this requirement:

- Provide an option to disable the key repeat function.
- Provide an option to set a key acceptance rate (how long the key must be depressed before being recognized).
- If the intention of repeating a key is to reach a target goal, provide an alternate way for the user to enter that target. For example, if a person were to increase volume from 1 to 20 by depressing a key 20 times, it would be easier to simply (or alternatively) press the numbers 2 and 0 to enter 20.

10-2.2.4 **Status of Locking/Toggle Controls or Keys Must Be Discernible**

Make sure that the status of all locking or toggle controls or keys is visually discernible, and discernible either through touch or sound.

Adhere to the following recommendations that support this requirement:

- Use two different types of feedback, such as a combination of tactile, audible, and visual feedback to help make products easier for people with sensory disabilities to use.
- When using audio feedback, consider associating intuitively meaningful sounds with actions. For example, try using increasingly high-pitched sounds with increasing amplitude. Use cascading sounds with rotary or slide controls with the pitch associated with the change in control.
- Provide an audio indication of a toggle status, instead of a continuous signal, sufficiently long enough to alert the user to the position of the toggle switch.

10-2.2.5 **When Touchscreens Are Used, Provide Alternate Access Method**

When touchscreens are used, provide a redundant set of controls that serves as an alternative access method for people with visual or other impairments. Here are some recommended techniques that might be used to comply with this requirement:

- Provide auditory cues that allow users to spatially explore the screen by moving their fingers across the screen (without activating the controls). For activating controls, offer a selection button that users can push to operate controls they have selected on the touchscreen. Some possible auditory cues include the following: (a) Provide a auditory description of the overall layout of the screen when a user touches the upper left-hand corner of the screen; (b) Provide an auditory name or description of each button or text input field as the user touches the control; (c) Provide different button or text input field edge sounds that indicate when a user is entering and leaving a button; (d) Provide a “white noise” sound as the user touches blank areas of the screen.
- Provide an auditory linear listing of all screen controls, or “speedlist,” that allows users to quickly discern and select controls without activating them. For activating controls, offer a selection button that users can push to operate controls they have selected from the speedlist on the touchscreen. In this technique, buttons and text inputs are lined up in a linear list fashion along the left edge of the screen. As the user runs their finger from the top left-hand corner to the bottom left-hand corner of the screen (sometimes along the groove formed by the touchscreen and the left cowl), a “speedlist” feature is turned on. After activating the speedlist, auditory descriptions of the buttons and text inputs are provided as the user moves their finger up and down the list, or as they press “up” and “down” arrow keys in the hardware controls. The first auditory description in the list is always a description of the overall function of the screen and the types of information and controls, which would be found in the list. In addition, provide a layered help system that allows users to have more information than the button or text input name, activated by an additional hardware control.

10-2.3 **Testing**

- a. *Requirement 1:* Ensure that all mechanically operated controls and keys are tactilely discernable:
 - (1) Check for tactile marks on top of the keys (not beside them) and raised marks that have a minimum height of 0.5 mm.
 - (2) On telephone keypads, check for a tactile marker on the “5” key, such as a “nib” or “bar,” on the top surface of it.
 - (3) On QWERTY keyboards, check for a raised bar on the “F” and “J” keys.
 - (4) Check for recessed keys or keys with concave tops, which aid visually and mobility impaired users in locating keys.

- (5) Check for key guards or overlays that help people with fine motor control problems.
 - (6) Check for other distinctions (shape, size, spacing, tactile markings) that make keys easier to remember and tactilely discernable.
- b. *Requirement 2:* Ensure that each control and key is operable with one hand and must not require tight grasping, pinching, or twisting of the wrist:
- (1) For each control or key, note if any of the following conditions exist: two hands are required to operate the control or key, a tight grasp is needed, a pinching or twisting of the wrist is need to operate the control.
 - (2) For push controls, measure the force needed to activate the control. The force required to activate controls and keys must not be more than 5 lbs. (22.2 N). The effects of knob diameter, toggle configuration, surface textures, surrounding surfaces, etc. will likely influence this measurement. Include measurements for only push controls, as it may be difficult to measure the force required by non push-button controls such as pull-type, rotary, slide, thumb wheels, and toggles.
- c. *Requirement 3:* Ensure appropriate key repeat rate and delay:
- Hold a key down for 2 seconds or more and observe if key repeat occurs.
 - Hold a key down for less than 2 seconds and note whether the key repeat occurred — it should not have.
 - Inspect the user manual and reference manual to determine if key repeat delay is adjustable. If so, note the allowed range of times for repeat delay.
- d. *Requirement 3:* Ensure that key repeat rate can be adjusted:
- Inspect the user manual and reference manual to determine if key repeat rate is adjustable. If so, note the allowed range of repeat rates.
- e. *Requirement 4:* Identify all locking or toggle controls or keys (excluding maintenance and setup features). For each locking or toggle control or key:
- Check that the status of the control or key is visually discernible.
 - Check for either an audible or tactile indicator for the status of the control or key.
- f. *Requirement 5:* Identify all touchscreen controls, keys or interfaces. For each control or input field:
- Check for auditory cues or audio features that allow users to spatially explore the screen or access a linear listing of all controls and inputs.

- Check for a hardware-based activation controls and optional “up” and “down” arrow buttons that allows users to navigate lists and activate controls once they have made a selection.
- Check for an optional layered help system that allows users to have more information than the button or text input name, activated by an additional hardware control.

10-2.4 References

The following references are applicable to the specific requirements stated here:

- Guide to the Section 508 Standards for Electronic and Information Technology, Telecommunications Products (1194.23), Updated: June 21, 2001
<http://www.access-board.gov/sec508/guide/1194.23.htm>
- Section 4.27.4 of the ADA Accessibility Guidelines (ADAAG), codified as the ADA Standards for Accessible Design as part of the Department of Justice’s regulation implementing title III of the ADA at 28 C.F.R. pt. 36, Appendix A Telecommunications Act Accessibility Guidelines
<http://www.access-board.gov/adaag/html/adaag.htm#4.27>
- Trace Research Center, University of Wisconsin, Guide to Section 508 Telecommunications
<http://www.trace.wisc.edu/docs/2002-508-collation/index.shtml?style=default#telecomm>
- Trace Center Research, University of Wisconsin, Kiosk accommodation
<http://www.tracecenter.org/world/kiosks/>
- Trace Research Center, University of Wisconsin, “Ergonomics of a non-visual touchscreen interface - a case study”.
http://trace.wisc.edu/docs/touchscreen_ergonomics2000/ergonomics.htm
This document provides information on touchscreen interfaces for people who are blind or have low vision.
- Tiresias – International Information on Visual Disability, guidelines for tactile identifiers on keys
<http://www.tiresias.org/guidelines/keys.htm>
- Enable Tech: Tools to Consider — Keyboards
<http://www.enabletech.ie/Tools2.html>

10-3 Biometric User Identification and Controls

When biometric forms of user identification or control are used, an alternative form of identification or activation, which does not require the user to possess particular biological characteristics, must also be provided (§1194.26, Provision c).

10-3.1 Rationale

Biometric controls refer to controls that are activated only if a particular biological feature of the end-user exists and matches specific criteria (e.g., voiceprint, fingerprint, retinal image).

Biometric controls are becoming more common, as they can provide a high level of security or offer increased efficiencies in user interaction with computer systems. Biometric controls are used for two primary purposes: security (i.e., user identification and authentication) and non-security commands or user input. One example is a high security computer system or information transaction machine that uses retinal scanners or fingerprint identification controls to identify users before providing them access to personal or sensitive data. Another example is a portable computer that offers an optional voice command feature to allow the user access to various applications or data stored on the computer. In the latter example, the voice commands are a benefit because they help the user make selections or provide input more quickly or in a “hands-free” mode.

While biometric controls offer many benefits, they can present significant barriers to people with various disabilities. This requirement addresses this problem by requiring that when biometric controls are used, an alternate access method must be provided that does not compromise security and that does not require specific biological features (e.g., voiceprint, fingerprint, retinal scan) to activate or operate the controls.

10-3.2 Techniques

When biometric forms of user identification or control are used, an alternative access method that does not require the user to possess particular biological characteristics must be provided.

Some examples include:

- A shared desktop computer located in a plant management office uses a fingerprint scanner to provide secure access to highly confidential files for a select group of Postal Service employees. As an alternative to the fingerprint scan, the system provides an alternate access method by allowing the user to enter a password and answer some additional verification questions. This alternative access method is also beneficial for all users, either as a redundant check or in situations where the primary method is inadequate (e.g., when the fingerprint scanner ceases to work properly, when users have a temporary disability such as a broken hand that is in a cast).

- A portable computer uses voice commands to allow users to activate key applications such as a contact database or calendar. As an alternative to the voice commands, the user can enter input using the computer keyboard.

10-3.3 Testing

- a. Inspect the product to determine if it uses biometric controls that require users to possess specific biological features (e.g., voice, retinal image, fingerprint, etc.).
- b. For each biometric control, determine if there is at least one alternative access method directly in the product that allows the user to perform the same functions that the biometric control supports.
- c. If the provision of an alternative access method directly in the product would compromise security, and if there are no other commercial products available that would meet business needs, an exception may need to be taken and documented (see chapter 4). If an exception is taken, an alternate format or alternate access method must be provided for people who cannot readily use the product (i.e., indirect access).

10-3.4 References

The following references are applicable to the specific requirements stated here:

- Biometrics Resource Center Web site at the National Institute for Standards and Technology
<http://www.itl.nist.gov/div895/biometrics>
- Guide to the Section 508 Standards for Electronic and Information Technology, Desktop and Portable Computer Products (1194.26), Updated: June 21, 2001
<http://www.access-board.gov/sec508/guide/1194.26.htm>
- Open Directory Project: Biometrics Links
<http://dmoz.org/Computers/Security/Biometrics/>

10-4 Industry-Standard Expansion Slots, Ports, and Connectors

Where provided, at least one of each type of expansion slots, ports, and connectors must comply with publicly available industry standards. (§1194.26, Provision d)

10-4.1 Rationale

Slots refer to the openings in a computer where you can insert a printed circuit board. Slots are often called expansion slots because they allow you to expand the capabilities of a computer. The boards you insert in expansion slots are called expansion boards or add-on boards. Slots are typically in the back of the computer.

Ports consist of an interface on a computer to which you can connect a device. Personal computers have various types of ports, such as USB, SCSI, parallel, and serial. Ports are the external connection points on computers that permit the use of such devices as modems, printers, keyboards, mice, and audio components.

Connectors are plugs and sockets that link two devices together, either by wire or wirelessly. Although taken for granted and rarely in the limelight, these components are more critical than most people would imagine. When not designed or constructed properly, they can prevent peripherals, such as assistive technology (AT), from interacting with a user's computer system.

An **industry standard** is one that is published and made available by the manufacturer, so that third party and cross-manufacturer developers may build compatible connections. Some examples are listed in the 508 technical assistance material. This provision requires connection points on a computer system to comply with an industry standard technical specification that is available to other manufacturers. This assures that the developers of assistive technology will have access to information concerning the design of system connections and thus be able to produce products that can use those connections.

Examples of publicly available industry standards may include USB, PS/2, Serial, ADB, SCSI interfaces, RS-232, Centronics (parallel), SCSI interfaces, and PCMCIA. This requirement essentially implies that a manufacturer cannot have all connection ports that are proprietary where standard ports are available.

10-4.2 Techniques

All expansion slots, ports and connectors on desktop and portable computers must comply with publicly available cross-manufacturer, non-proprietary, industry standards.

Connection points on a computer system must comply with an industry standard technical specification that is available to other manufacturers. Examples of publicly available industry standards may include RS-232, Centronics, SCSI interfaces, PCMCIA, or USB.

10-4.3 Testing

- a. Conduct an inspection of the product to inventory the expansion slots, ports and connectors.
- b. For each expansion slot, port or connectors, is at least one of each type (slot, port or connector) compliant with a publicly available industry standard?

10-4.4 References

The following references are applicable to the specific requirements stated here:

- Guide to the Section 508 Standards for Electronic and Information Technology, Desktop and Portable Computer Products (1194.26), Updated: June 21, 2001
<http://www.access-board.gov/sec508/guide/1194.26.htm>
- EIA232E, "Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange", EIA (Electronic Industries Association)
http://global.ihs.com/doc_detail.cfm?currency_code=USD&customer_id=212543484D0A&shopping_cart_id=27274833254B3020495A2020280A&country_code=US&lang_code=ENGL&item_s_key=00125234&item_key_date=020231&input_doc_number=&input_doc_title=interface%20data%20terminal%20equipment%20serial%20binary%20data
- IEEE Std.1284-1994, "Standard Signaling Method for a Bi-directional Parallel Peripheral Interface for Personal Computers", IEEE (Institute of Electrical and Electronics Engineers)
http://global.ihs.com/doc_detail.cfm?currency_code=USD&customer_id=21254C4A4B0A&shopping_cart_id=27274833254B3020495A2020270A&country_code=US&lang_code=ENGL&item_s_key=00151636&item_key_date=991231&input_doc_number=1284&input_doc_title=&org_code=IEEE
- Small Computer System Interface (SCSI), a set of ANSI-standard electronic interfaces that allow personal computers to communicate with peripheral hardware
http://global.ihs.com/search_res.cfm?currency_code=USD&customer_id=21254A4A4B0A&shopping_cart_id=27274833254B3020495A2020270A&country_code=US&lang_code=ENGL&input_doc_title=scsi&org_code=ANSI

- PCMCIA Standard Release 2.1/JEIDA 4.2 - July 1993, PCMCIA (Personal Computer Memory Card International Association)
<http://www.pcmcia.org>
- Universal Serial Bus Specification, Revision 2.0 April 27, 2000, Compaq Computer Corporation, Hewlett-Packard Company, Intel Corporation, Lucent Technologies Inc., Microsoft Corporation, NEC Corporation, Koninklijke Philips Electronics N.V.
http://www.usb.org/developers/data/usb_20.zip
- IrDA SIR Data Specification for an interoperable universal two way cordless infrared light transmission data port: IrDA Serial Infrared Physical Layer Link Specification (IrPHY), IrDA Serial Infrared Link Access Protocol (IrLAP) and IrDA Serial Infrared Link Management Protocol (IrLMP), IrDA Tiny TP (1,331KB) and IrDA Point and Shoot Profile and Test Specification
<http://www.irda.org/standards/specifications.asp>
- IEEE Standard 1394b, "High-Performance Serial Bus, 2002, IEEE Standards Association" (IEEE-SA)
<http://www.ieee.org/products/onlinepubs/stand/standards.html>

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Appendix 10-A

Desktop and Portable Computers Accessibility Checklist

Use this as a tool for high-level guidance in determining if a desktop or portable computer is compliant or accessible.

| | Requirement Number and Summary | Yes, No, or N/A | Comments |
|------|---|-----------------|----------|
| 10-2 | <p>Mechanical or Touch-Operated Controls, Keys and Touch Screens. Desktop and portable computer products that have mechanically operated controls and keys must comply with Section 7-12 in the Chapter 7: Telecommunications Products (§1194.26, Provision a and §1194.26, Provision b):</p> <ol style="list-style-type: none"> 1. Controls and keys must be tactilely discernible without activating the controls or keys. 2. Controls and keys must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys must be 5 lbs. (22.2 N) maximum. 3. If key repeat is supported, the delay before repeat must be adjustable to at least 2 seconds. Key repeat rate must be adjustable to 2 seconds per character. 4. The status of all locking or toggle controls or keys must be visually discernible, and discernible either through touch or sound. | | |
| 10-3 | <p>Biometric User Identification and Controls. When biometric forms of user identification or control are used, an alternative form of identification or activation, which does not require the user to possess particular biological characteristics, must also be provided (§1194.26, Provision c).</p> | | |
| 10-4 | <p>Industry-Standard Expansion Slots, Ports and Connectors. Where provided, at least one of each type of expansion slots, ports and connectors must comply with publicly available industry standards. (§1194.26, Provision d)</p> | | |

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11 Information, Documentation, and Support

11-1 Overview

11-1.1 Contents

This chapter contains the specific electronic and information technology (EIT) performance requirements related to the following subpart of Section 508:

EIT Technical Standard 1194.41, 11 Information, Documentation, and Support, provisions (a) thru (c).

11-1.2 Summary

11-1.2.1 Technology

The phrase “information, documentation, and support” is used to define the support material required to understand and use EIT. It includes interactions that support people with limited vision, mobility, speech, or hearing.

The requirements in this chapter cover the following:

- All information about EIT products and their support services, regardless of technology type. Persons with disabilities need this information to support their effective use of the EIT products covered by Section 508.
- Any documentation provided by the Postal Service or its EIT suppliers to its technology users must be available upon request in appropriate alternate formats. Agencies are required to supply end users with information about accessibility or compatibility features that are built into a product, upon request. This information is vital in knowing how to use certain products such as self-contained, closed products. It is also essential for the installation of assistive technology in IT devices that are open to software which provides functions as speech output, speech recognition, screen enlargement, or keyboard alternatives.
- Help desks and other technology support services serving the Postal Service’s employees and customers must be able to accommodate the communications needs of persons with disabilities. For example, an agency help desk may need to communicate through a TTY. The help

desk or support service must also be familiar with such features as keyboard-only access and other options important to people with disabilities. Electronic methods of interaction — e.g., Web forms, IVR systems, and online help systems — must also work properly for the employees and customers of the Postal Service.

The requirements in this chapter support Part 1194.41 of Section 508 and cover all classes of technology. The requirements are applicable to a single device, a device that represents the convergence of multiple technical standards (e.g., a fax machine that supports two-way voice communications), or a custom set of products within a complex system.

11-1.2.2 **Audience**

This chapter applies to anyone who buys or develops information, documentation, and support services or technology for the Postal Service (i.e., Postal Service employees, suppliers, contractors, and business partners).

11-1.3 **Structure and Use**

Each part of this chapter describes the specific requirements that support one or more provisions in the technical standards for information, documentation, and support services. The technical standards of Section 508 were written primarily from a technology perspective. The Postal Service may consolidate some provisions to help Postal Service employees and business partners understand Postal Service compliance requirements from the perspective of designing for accessibility. Each specific requirement includes a rationale, techniques, testing methods, and references as shown below in section 11-2.

11-1, Overview

11-2, Provide support documentation in alternate formats
(Provision §1194.41a)

- Rationale
- Techniques
- Testing
- References

11-3, Provide access to a description of accessibility features
(Provision §1194.41 b)

11-4, Accommodate various communication needs in support services
(Provision §1194.41 c)

Appendix 11-A, Checklist

11-1.4 **Introduction to Information, Documentation, and Support Service Accessibility**

Every instance of technology needs informational and instructional material. Despite “intuitive” interfaces, effective use of sophisticated technology requires a full spectrum of documentation and support services to help end users understand and effectively use product functions and features. Regardless of the class (or classes) of technology represented by a given EIT product, both the product itself and its documentation can present the following challenges to people with disabilities:

- People who are deaf or who have hearing impairments are typically faced with challenges such as:
 - Audible beeps without an equivalent visual signal.
 - Instructional videos that do not include captioning.
 - Telephone support systems — both human support and IVR systems — that are inaccessible or unsupportive of multiple communication modes.
- People who are blind or who have visual impairments are typically faced with challenges such as:
 - Documentation available only in print.
 - Documentation available only in proprietary electronic formats.
 - Multimedia information that does not include an accessible and appropriate audio channel.
 - Graphics and diagrams that do not include text-based alternate descriptions.
- People who have dexterity or mobility impairments are typically faced with challenges such as:
 - Navigation of graphical information systems that rely on mouse input.
 - Lack of timeout controls and saving of user input upon timeout in IVR and interactive forms.
 - Lack of error-recovery features.

11-1.5 **General Requirements**

Accessibility is accomplished not only by purchasing or developing compliant products that accommodate the widest range of users but also by insuring that the information, documentation, and support services for the products are also compliant. Listed below are some general requirements that will help the Postal Service ensure continued accessibility of both purchased and developed EIT information, documentation and support:

- The Postal Service will procure products and systems with documentation and support that are accessible to the users of the system. These users may be Postal Service employees who access the system or customers who will interact with the system or its developed outputs.

- The Postal Service will develop products and systems that have accessible information, documentation, and support.

11-1.6 **Testing for Compliance**

When testing products and systems for compliance, it is crucial to be aware of the end-user environment. This includes an understanding of the product's stated accessibility features in the context of Postal Service use.

Manual testing, using the testing methods described in this chapter, is mandatory, because it simulates use by disabled users. Automated testing tools or integrated development environment (IDE) features, useful in testing some technical classes of EIT, are of little value for evaluation of information, documentation, and support. Perhaps one of the best ways to test for accessibility of information, documentation, and support, is to simulate use of product accessibility documentation, alternate formats for product documentation, and support services.

11-2 **Provide Support Documentation in Alternate Formats**

Product support documentation provided to end users must be made available in alternate formats upon request, at no additional charge (§1194.41, Provision a).

11-2.1 **Rationale**

The goal of this provision is to enable people with disabilities to access independently, and in a timely manner, the information and support available to non-disabled people. From the Final Rule of Section 508, alternate formats are defined as follows: "Formats usable by people with disabilities may include, but are not limited to, Braille, ASCII text, large print, recorded audio, and electronic formats that comply with this part."

In common usage, the most universal format is HTML, as defined in Chapter 6, Web-Based Information and Applications Accessibility Guidelines. This format separates content and format, and — if done properly — contains proper document structure. HTML also provides nonlinear access, which is virtually essential for access to large and complex collections of information.

Many common help systems rely on HTML or have an interface that is accessible and functionally equivalent to a well-structured Web resource.

For self-contained, closed products, both the content and the accessibility functions need to be an integral aspect of the design.

11-2.2 **Techniques**

11-2.2.1 **For Purchased Products, Evaluate Whether Documentation Can Be Provided in Alternate Formats**

For purchased products, evaluate the supplier's VPAT or similar statement that describes how the product's documentation can be provided in alternate formats.

If there are special needs that are required by the particular Postal Service technology implementation, alternate formats can be specified as an additional deliverable at time of purchase.

11-2.2.2 **For Developed Products, Provide All Documentation on Alternate Formats**

For developed products, ensure that all product documentation is provided in alternate formats.

Adhere to the requirements for Web-based information in chapter 6 for documentation provided via the Internet or Web.

11-2.3 **Testing**

- a. Inspect the product or evaluate the supplier's VPAT or similar statement that describes whether the product in question's documentation is provided in alternate formats, and that those formats are clearly communicated. Alternate formats may include, but are not limited to, Braille, ASCII text, large print, recorded audio, and electronic formats that comply with applicable requirements depending on their delivery method.
- b. For documentation delivered via the Web or Internet, adhere to the requirements for Web-based information stated in Chapter 6, Web-based Information and Applications Accessibility Guidelines.
- c. For documentation delivered within a software application (i.e., executable demo), adhere to the requirements for software applications stated in chapter 5.
- d. For documentation delivered using video or multimedia, adhere to the requirements for video and multimedia found in Chapter 8, Video and Multimedia Products.
- e. Review the documentation using the appropriate testing methods based on delivery method. Use the functional performance criteria found in section 4-2.1 to ensure that the documentation can be accessed by people with limited vision, hearing, speech, or mobility.
- f. If an exception was taken for a product whose documentation is not fully accessible, define and clearly communicate the appropriate alternate formats or access methods that will be used to provide equivalent access to people with disabilities who can not readily use the product documentation.

11-2.4 **References**

The following reference applies to the specific requirements stated in this section:

- Guide to the Section 508 Standards for Electronic and Information Technology, Equivalent Facilitation
<http://www.access-board.gov/sec508/guide/scope.htm#Equivalent%20Facilitation>

11-3 Provide Access to a Description of Accessibility Features

End users must have access to a description of the accessibility and compatibility features of products in alternate formats or alternate methods upon request, at no additional charge. (§1194.41, Provision b).

11-3.1 **Rationale**

For products that have built-in accessibility features or support the installation of assistive technology, information on the use of these features must be have clear documentation of how to use such features effectively. For self-contained, closed products, both the content and the accessibility functions need to be an integral aspect of the design.

11-3.2 **Techniques**

11-3.2.1 **For Purchased Products, Evaluate Whether Description of Accessibility Features Can Be Provided in Alternate Formats**

For purchased products, evaluate the supplier's VPAT or similar statement that describes the product's built-in accessibility features in an alternate format or alternate access method.

If there are special needs that are required by the particular Postal Service implementation, alternate formats can be specified as an additional deliverable at time of purchase.

11-3.2.2 **For Developed Products, Provide Description of Accessibility Features in Alternate Formats**

For developed products, ensure that all product documentation includes a description of the product's built-in accessibility features in an appropriate alternate format or alternate access method.

Adhere to the requirements for Web-based information in chapter 6 for documentation provided via the Internet or Web.

11-3.3 Testing

- a. Inspect the product or evaluate the supplier's VPAT or similar statement that describes whether the product in question's documentation includes a description of the product's built-in accessibility features.
- b. Review the description of the product's built-in accessibility features and test those features using the documentation and the functional performance criteria found in section 4-2.1 to ensure that the documentation can be accessed by people with limited vision, hearing, speech, or mobility.
- c. If an exception was taken for a product whose documentation does not provide built-in accessibility features or a description of those accessibility features, define and clearly communicate the appropriate alternate formats or access methods that will be used to provide equivalent access to people with disabilities who can not readily use the product documentation.

11-3.4 References

The following reference applies to the specific requirements stated in this section:

- Guide to the Section 508 Standards for Electronic and Information Technology, Equivalent Facilitation
<http://www.access-board.gov/sec508/guide/scope.htm#Equivalent%20Facilitation>

11-4 Accommodate Various Communication Needs in Support Services

Support services for products must accommodate the communication needs of end-users with disabilities (§1194.25, Provision c).

11-4.1 Rationale

Support services can include telephone support (live and IVR), Web support (FAQs, searchable knowledge bases, downloads and updates, interactive forms, chat, subscriptions, online events, training courses, and newsgroups), and dispatched technicians. Each of these presents somewhat different challenges to people with diverse functional limitations (see section 11-1.4). Awareness of needs and provisions for accessible formats is the clear goal.

11-4.2 Techniques

11-4.2.1 For Purchased Products, Evaluate Whether Support Services Are Accessible to People with Disabilities

For purchased products, evaluate the supplier's VPAT or similar statement that describes how the product support services (regardless of type) are accessible to people with disabilities.

If there are special needs that are required by the particular Postal Service implementation, alternate formats or access methods can be specified as an additional deliverable at time of purchase. All published support material must be provided in an appropriate accessible format, and descriptions of how to access the support materials must be readily accessible. Adhere to the requirements for Web-based information in chapter 6 for documentation provided via the Internet or Web. Adhere to the requirements for telecommunications products for telephone-based support services (live and IVR).

11-4.2.2 For Developed Products, All Support Services Must Be Accessible to People with Disabilities

For developed products, ensure that all product support services (regardless of type) are accessible to people with disabilities.

All published support material must be provided in an appropriate accessible format, and descriptions of how to access the support materials must be readily accessible. Adhere to the requirements for Web-based information in chapter 6 for documentation provided via the Internet or Web. Adhere to the requirements for telecommunications products for telephone-based support services (live and IVR).

11-4.3 Testing

- a. Inspect the product or evaluate the supplier's VPAT or similar statement that describes how the product in question's support services support people with disabilities. Make sure that the support services are clearly communicated.
- b. For support services delivered via the Web or Internet, adhere to the requirements for Web-based information stated in chapter 6. Web or internet based support services can include, but are not limited to, FAQs, searchable knowledge bases, downloads and updates, interactive forms, chat, subscriptions, online events, training courses, and newsgroups.
- c. For support services delivered using telecommunications products or services, including live support or IVR, adhere to the requirements for telecommunications products stated in chapter 7.
- d. Regardless of delivery method, use the functional performance criteria found in section 4-2.1 to ensure that the support services can be accessed by people with limited vision, hearing, speech, or mobility.

- e. If an exception was taken for a product whose support services are not fully accessible, define and clearly communicate the appropriate alternate formats or access methods that will be used to provide equivalent access to people with disabilities who can not readily use the product support services.

11-4.4 **References**

The following reference applies to the specific requirements stated in this section:

- Guide to the Section 508 Standards for Electronic and Information Technology, Equivalent Facilitation
<http://www.access-board.gov/sec508/guide/scope.htm#Equivalent%20Facilitation>

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Information, Documentation, and Support Accessibility Questions

Products that are freestanding, nonportable, and intended to be used in one location and which have operable controls must comply with the following requirements:

| | Standard | Questions to Ask | Notes |
|-----|--|---|--------------|
| | <i>Subpart D-Information, Documentation, and Support</i> | | |
| (a) | Product support documentation provided to end users must be made available in alternate formats upon request, at no additional charge. | Does the program come with documentation that is accessible to persons with disabilities? | |
| (b) | End users must have access to a description of the accessibility and compatibility features of products in alternate formats or alternate methods upon request, at no additional charge. | Can the vendor provide a description of accessibility features (e.g., the VPAT)? | |
| (c) | Support services for products must accommodate the communication needs of end users with disabilities. | Can the vendor provide a description of its accessibility features of all support features? | |

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