WILLIAMS SOUND ®

ADA SPECIFICATION [STANDARDS FOR ACCESSIBLE DESIGN 9B]

09/27/2012

2010 ADA Standards for Accessible Design
Introduction
The Department of Justice published revised regulations for Titles II and III of the Americans with Disabilities Act of 1990 "ADA" in the Federal Register on September 15, 2010. These regulations adopted revised, enforceable accessibility standards called the 2010 ADA Standards for Accessible Design "2010 Standards" or "Standards". The 2010 Standards set minimum requirements – both scoping and technical -- for newly designed and constructed or altered State and local government facilities, public accommodations, and commercial facilities to be readily accessible to and usable by individuals with disabilities.

Adoption of the 2010 Standards also establishes a revised reference point for Title II entities that choose to make structural changes to existing facilities to meet their program accessibility requirements; and it establishes a similar reference for Title III entities undertaking readily achievable barrier removal.

The Department has assembled into a separate publication the revised regulation guidance that applies to the Standards. The Department included guidance in its revised ADA regulations published on September 15, 2010. This guidance provides detailed information about the Department's adoption of the 2010 Standards including changes to the Standards, the reasoning behind those changes, and responses to public comments received on these topics. The document, Guidance on the 2010 ADA Standards for Accessible Design, can be downloaded from www.ada.gov

For More Information
For information about the ADA, including the revised 2010 ADA regulations, please visit the Department's website www.ADA.gov; or, for answers to specific questions, call the toll-free ADA Information Line at 800-514-0301 (Voice) or 800-514-0383 (TTY).

219 Assistive Listening Systems

219.1 General.
Assistive listening systems shall be provided in accordance with 219 and shall comply with 706.

219.2 Required Systems.
In each assembly area where audible communication is integral to the use of the space, an assistive listening system shall be provided.

EXCEPTION: Other than in courtrooms, assistive listening systems shall not be required where audio amplification is not provided.

219.3 Receivers.
Receivers complying with 706.2 shall be provided for assistive listening systems in each assembly area in accordance with Table 219.3. Twenty-five percent minimum of receivers provided, but no fewer than two, shall be hearing-aid compatible in accordance with 706.3.

EXCEPTIONS:

1. Where a building contains more than one assembly area and the assembly areas required to provide assistive listening systems are under one management, the total number of required receivers shall be permitted to be calculated according to the total number of seats in the assembly areas in the building provided that all receivers are usable with all systems.
2. Where all seats in an assembly area are served by an induction loop assistive listening system, the minimum number of receivers required by Table 219.3 to be hearing-aid compatible shall not be required to be provided.

Table 219.3 Receivers for Assistive Listening Systems

Capacity of Seating in Assembly Area	Minimum Number of Required Receivers	Minimum Number of Required Receivers Required to be Hearing-aid Compatible
50 or less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats*	2
201 to 500	2, plus 1 per 25 seats over 50 seats*	1 per 4 receivers*
501 to 1000	20, plus 1 per 33 seats over 500 seats*	1 per 4 receivers*
1001 to 2000	35, plus 1 per 50 seats over 1000 seats*	1 per 4 receivers*
2001 and over	55 plus 1 per 100 seats over 2000 seats*	1 per 4 receivers*

*Or fraction thereof.

New ADAAG	DOJ Standards for Accessible Design	International Building Code
706 Assistive Listening Systems	4.33.7 Types of Listening Systems. Assistive listening systems (ALS) are intended to augment standard public address and audio systems by providing signals which can be received directly by persons with special receivers or their own hearing aids and which eliminate or filter background noise. The type of assistive listening system appropriate for a particular application depends on the characteristics of the setting, the nature of the program, and the intended audience. Magnetic induction loops, infra-red and radio frequency systems are types of listening systems which are appropriate for various applications.	ANSI 706 Assistive Listening Systems
706.1 General. Assistive listening systems required in assembly areas shall comply with 706.		ANSI 706.1 General. Accessible assistive listening systems in assembly areas shall comply with Section 706.
706.2 Receiver Jacks. Receivers required for use with an assistive listening system shall include a 1/8 inch (3.2 mm) standard mono jack.		ANSI 706.2 Receiver Jacks. Receivers required for use with an assistive listening system shall include a 1/8–inch (3.2 mm) standard mono jack.
706.3 Receiver Hearing-Aid Compatibility. Receivers required to be hearing-aid compatible shall interface with telecoils in hearing aids through the provision of neckloops.		ANSI 706.3 Receiver Hearing–Aid Compatibility. Receivers required to be hearing aid compatible shall interface with telecoils in hearing aids through the provision of neck loops.
706.4 Sound Pressure Level. Assistive listening systems shall be capable of providing a sound pressure level of 110 dB minimum and 118 dB maximum with a dynamic range on the volume control of 50 dB.		ANSI 706.4 Sound Pressure Level. Assistive listening systems shall be capable of providing a sound pressure level of 110 dB minimum and 118 dB maximum, with a dynamic range on the volume control of 50 dB.
706.5 Signal-to-Noise Ratio. The signal-to-noise ratio for internally generated noise in assistive listening systems shall be 18 dB minimum.		ANSI 706.5 Signal–to–Noise Ratio. The signal–to–noise ratio for internally generated noise in assistive listening systems shall be 18 dB minimum.
706.6 Peak Clipping Level. Peak clipping shall not exceed 18 dB of clipping relative to the peaks of speech.		ANSI 706.6 Peak Clipping Level. Peak clipping shall not exceed 18 dB of clipping relative to the peaks of speech.
	4.33.6 Placement of Listening Systems. If the listening system provided serves individual fixed seats, then such seats shall be located within a 50 ft (15 m) viewing distance of the stage or playing area and shall have a complete view of the stage or playing area.	
703.7.2.4 Assistive Listening Systems. Assistive listening systems shall be identified by the International Symbol of Access for Hearing Loss complying with Figure 703.7.2.4.	(4) Assistive Listening Systems. In assembly areas where permanently installed assistive listening systems are required by 4.1.3(19)(b) the availability of such systems shall be identified with signage that includes the international symbol of access for hearing loss (Fig 43(d)). NOTE: Figure 43(d) illustrates the International Symbol of Access for Hearing Loss, a stylized ear with a diagonal slash in the field.	ANSI 703.6.3.3 Assistive Listening Systems. Assistive listening systems shall be identified by the International Symbol of Access for Hearing Loss complying with Figure 703.6.3.3
ANSI 703.6.3.3 Assistive Listening Systems. Assistive listening systems shall be identified by the International Symbol of Access for Hearing Loss complying with Figure 703.6.3.3.		

The landmark Americans with Disabilities Act (ADA), enacted on July 26, 1990, provides comprehensive civil rights protections to individuals with disabilities in the areas of employment (title I), State and local government services (title II), public accommodations and commercial facilities (title III), and telecommunications (title IV). Both the Department of Justice and the Department of Transportation, in adopting standards for new construction and alterations of places of public accommodation and commercial facilities covered by title III and public transportation facilities covered by title II of the ADA, have issued implementing rules that incorporate the Americans with Disabilities Act Accessibility Guidelines (ADAAG), developed by the Access Board.

UNITED STATES ACCESS BOARD
A FEDERAL AGENCY COMMITTED TO ACCESSIBLE DESIGN
ASSISTIVE LISTENING SYSTEMS

ADA Accessibility Guidelines for Buildings and Facilities (ADAAG)
3.5 Definitions.
Assembly Area. A room or space accommodating a group of individuals for recreational, political, social, civic, or amusement purposes, or the consumption of food and drink.

4.1.3. Accessible Buildings:
New Construction. Accessible buildings and facilities shall meet the following minimum requirements [...]

(19)* Assembly areas
(b) This paragraph applies to assembly areas where audible communications are integral to the use of the space (e.g., concert and lecture halls, playhouses and movie theaters, meetings rooms, etc.). Such assembly areas, if (1) they accommodate at least 50 persons, or if they have audio-amplification systems, and (2) they have fixed seating, shall have a permanently installed assistive listening system complying with 4.33.

For other assembly areas, a permanently installed assistive listening system, or an adequate number of electrical outlets or other supplementary wiring necessary to support a portable assistive listening system shall be provided. The minimum number of receivers to be provided shall be equal to 4 percent of the total number of seats, but in no case less than two. Signage complying with applicable provisions of 4.30 shall be installed to notify patrons of the availability of a listening system.

4.30 Signage.
4.30.7* Symbols of Accessibility.
(4) Assistive Listening Systems.
In assembly areas where permanently installed assistive listening systems are

BULLETIN 9B: FOR INSTALLERS

How do assistive listening systems (ALS) interface with public address (PA) systems?
Public address systems are, in fact, assistive listening systems. They are designed to help people hear across a distance. In a PA system, the sound is picked up at a microphone and delivered through speakers that bring the amplified sound closer to listeners in an audience. For many people and in many circumstances, a loudspeaker may provide enough gain in volume for adequate speech perception. But no matter how well-placed the loudspeaker(s), perception of air-borne speech signals will be difficult for people with hearing loss unless background noise and reverberation can be carefully controlled. The same microphone pick-up used in the PA system can also serve an assistive listening system (ALS or ALD). By bridging the acoustical space between the source and the listener, an ALS circumvents the effects of distance (drop in volume), background noise (competing sound), and reverberation (reflecting sound that blurs the desired signal).

The sound signals delivered by the ALS do not travel through acoustical space before arriving at listeners' ears. Thus, they are not weakened by distance or degraded by noise and reverberation during the transmission process. Instead, signals are transmitted via electromagnetic, radio, or light waves to specialized receivers used by listeners. An ALS eliminates the last acoustical leg of the signal transmission path, providing listeners with hearing impairments with a parallel transmission path that short-cuts the usual delivery process.

What are the benefits of bridging acoustical space?
It is necessary here to emphasize the distinction between audibility and comprehension. Certainly, the signals delivered by loudspeakers can ensure audibility for almost everyone. For a hearing-impaired person, however, loudness is just one part of the listening equation. Of course, the signal must be audible to listeners with and without hearing aids in order to understand it. But, for most people with hearing loss, the comprehension of verbal messages takes more than audibility. Comprehension also depends upon the nature of the hearing loss and on the acoustical properties of the space. In the most common type of problem, particularly affecting older persons, hearing acuity is poorer at the higher frequencies than the lower. However, the acoustical characteristics of speech that allow listeners to distinguish between speech sounds occur largely in the higher frequencies. Thus, the common complaint of people with hearing loss, "I can hear but I don't understand": they can "hear" the low frequency components of speech signals, and thus know someone is talking, but cannot" understand" because the higher frequencies that carry the sounds necessary for differentiation between letters and sounds are being filtered out by their hearing loss. Increasing loudness, by itself, will not measurably improve this situation.

In addition to the filtering impact of the hearing loss, the nature of many hearing problems is that the analytic powers of the cochlea are also compromised. Thus, people may have difficulty resolving the separate components of complex acoustic signals (as in a piano chord) or discriminating fine temporal differences within speech sounds. For example, the distinction between such voiced and voiceless sounds as /p/ and /b/ or /t/ and /d/ depend as much on detecting timing differences as it does upon hearing the voiced components. Beyond a pure sensitivity loss, then, and depending upon the specific site and type of damage to the cochlea and the higher auditory pathways, other psychoacoustic abnormalities may co-exist with diminished hearing thresholds and interfere with speech perception.

required by 4.1.3(19)(b), the availability of such systems shall be identified with signage that includes the international symbol of access for hearing loss (see Figure 1).

International Symbol of Access for Hearing Loss

Figure 1: International Symbol of Access for Hearing Loss

4.33 Assembly Areas

4.33.6* Placement of Listening Systems. If the listening system provided serves individual fixed seats, then such seats shall be located within a 50 ft (15 m) viewing distance of the stage or playing area and shall have a complete view of the stage or playing area.

4.33.7* Types of Listening Systems. Assistive listening systems (ALS) are intended to augment standard public address and audio systems by providing signals which can be received directly by persons with special receivers or their own hearing aids and which eliminate or filter background noise. The type of assistive listening system appropriate for a particular application depends on the characteristics of the setting, the nature of the program, and the intended audience. Magnetic induction loops, infra-red and radio frequency systems are types of listening systems which are appropriate for various applications.

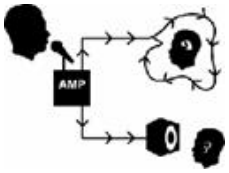

Figure 2: An Induction Loop (IL) System

Additionally, these auditory pathologies interact with external acoustic conditions in such a way as to produce a disproportionate effect upon speech perception. In an optimal acoustical situation, that is, in quiet, a normally hearing person can achieve speech perception scores of 96% while a listener with a hearing impairment can obtain no more than an 84% score. If a moderate degree of noise and/or reverberation is introduced into the room, scores will drop: to 88% – a slight decline – for the listener with normal hearing but to 40% – a precipitate and overwhelming change – for the person with hearing loss.

Increasing the loudness of the signal will not remedy this situation because greater signal volume also produces higher levels of background noise and reverberation. What needs to be increased to improve speech perception is the signal-to-noise (S/N) ratio. Studies show that increasing signal volume relative to background noise and reverberation can compensate to some degree for the disproportionate effect of noise and reverberation on speech perception by people with hearing loss. By delivering an amplified signal directly to the ear, signal volumes can be increased even though noise levels in the room remain the same. In effect, what we're doing with an ALS is attempting to replicate a perfect listening situation for the person with a hearing impairment, the one in which (in the example above) a score of 84% was achieved. While we can't always provide the perfect signal, we can, through an ALS, significantly improve its quality over that which would be received via the loudspeaker system.

What ALSs do for people with hearing loss, then, is to permit them to function to the limits of their residual hearing capacities. They do more than this, however. Often people with hearing impairments are able, with a great deal of effort, and by expending a great deal of energy, to understand speech signals in large-area listening venues. They can get the message, but in doing so they have to focus so intently on receiving the message that they have difficulty attending to what is being said. Unlike people with normal hearing, they can't really relax and enjoy the listening experience. ALSs can optimize the listening experience and minimize the stress of concentration.

How many people in our society can benefit from an ALS?

The statistics regarding the number of people with hearing loss in our society vary depending upon the source and the criterion used to define hearing loss. Most sources give this number as between 24 and 28 million people, or about 10 percent of the population. Hearing-impairment increases with age; it is estimated that the majority of people over the age of 65 have some degree of hearing loss. Additionally, noise-induced hearing loss is increasing steadily. Due to the increased longevity and the aging of our population, the total number (and the percentage) of people with hearing loss is likely to be substantial in the future. Most of these people would be able to benefit from an ALS. Some will benefit more than others, but everyone can obtain some advantages from using an ALS, in comprehension and in the effort they have to make in order to comprehend.

What are the statutory requirements for ALS for specific venues?

The Americans with Disabilities Act of 1990 (ADA) requires that buildings and facilities be accessible to and usable by people with disabilities. This includes communications access for people with hearing loss.

The ADA Accessibility Guidelines (ADAAG), adopted as the ADA standards for accessible design by the Department of Justice (DOJ) in 1991, require that certain newly constructed and altered assembly facilities where audible communications are integral to the use of the space, be designed and constructed to include assistive listening systems (see sidebar). In addition, DOJ regulations implementing title II (covering the public sector) and title III (covering the private sector) of the ADA include requirements for effective communication with people with disabilities that may require the installation of fixed or portable ALSs in existing assembly facilities (see sidebar).

The ADA does not cover private clubs and entities that are operated and controlled by religious organizations. However, many houses of worship make ALSs available to their congregants, not as a matter of law but as a service, and club facilities used by other organizations must support ALSs required for meetings and performances.

What types of systems are available?

There are three types of large area ALSs:

Induction Loop (Figure 2)

In the first type, the induction loop (IL) system, a loop of wire encircles the listening area or is embedded in a mat placed under a rug. This loop of wire is connected to the amplifier output of a public address (PA) system instead of, or in addition to, the usual loudspeaker (input is through the microphone serving the PA system). The IL system produces an electromagnetic field around the wire that can be picked up by a telecoil in a hearing aid.

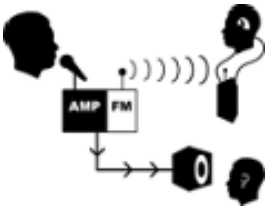

Figure 3: An FM System

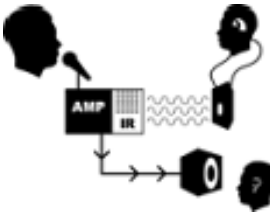

Figure 4: An Infrared (IR) System

A monaural ear-bud, a standard stethoscope-type headset, and a specialized headphone with electronics built-in for infrared reception

Figure 5: Top: A monaural ear-bud (not recommended but sometimes provided); Bottom: a standard stethoscope-type headset; Bottom: a specialized headphone with electronics built-in for infrared reception.

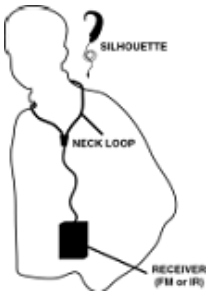

Figure 6: Coupling a hearing aid to an ALS receiver using a neckloop or silhouette.

About 30% of hearing aids include T- coils, which also facilitate telephone communication. When the electromagnetic field emanating from the wire loop intersects these coils, it "induces" an alternating electrical current in the coil. This electrical current is then processed by the hearing aid in the same way a microphone processes acoustical signals. The major advantage of IL systems is that listeners whose hearing aids include T- coils always have an ALS receiver with them.

Facilities that provide an IL system must also provide telecoil receivers for people who do not use hearing aids or who wear hearing aids that do not have telecoils. These special receivers come in various shapes and sizes, but all contain a wire coil to detect the electromagnetic field and an amplifier to increase the signal level.

Disadvantages of IL systems can include spill-over of the magnetic field into adjacent areas (both horizontally and vertically), susceptibility to stray electromagnetic fields, variations in the electromagnetic field within the loop, and issues related to the quality and physical orientation of the telecoils. With a proper installation and appropriate hearing aids, these problems can be minimized and often eliminated.

FM (Figure 3)

The second type is the FM system. An FM assistive listening system is simply a variation on the commercial FM radio. The signals are broadcast by FM transmitters and picked up by listeners using a receiver tuned to the transmitting frequency. FM receivers must be made available by the facilities that use FM-based ALSs. The FCC has reserved the non-commercial 72MHz to 75MHz and the 216 MHz to 217 MHz bands for auditory assistance devices. The lower band is a non-exclusive band, which means that interference from other users in the same frequencies may occur (such as from emergency vehicles of various kinds). The effective range of the lower FM band is a radius of about 300 to 500 feet, given the power limits set by the FCC (80 millivolts per meter at 3 meters). The effective transmitting range of the 216-217 MHz band is approximately twice that of the lower band.

There are several disadvantages of FM systems. The first is that privacy is not possible. The FM signals do not stay contained within the four walls of the enclosure. If privacy is a consideration, then an FM system is not appropriate for that facility. Different rooms can broadcast at different frequencies to receivers tuned to those frequencies, making FM systems useful in school classrooms and multiplex cinemas. But they should not be used in courtrooms where confidentiality is an issue. The second potential problem is the flip-side of the first: radio signals originating outside of the facility can enter the facility and interfere with reception. One cannot prevent occasional interference, as when some emergency vehicle in the area transmits on the same frequency used in the venue. However, persistent interference can usually be overcome by selecting alternate frequencies within the permitted bands. On the up side, it is relatively easy with an FM system to ensure adequate signal strength at all seat locations, even in the largest venues.

Infrared (Figure 4)

The third type of ALS is the infrared (IR) light system. In an IR system, audio signals from any source are conveyed to listeners via infrared light waves (using light-emitting diodes) invisible to the human eye. The light waves are picked up by a photo detector diode contained within the optical bubble found on every IR receiver. The receiver then extracts the audio information from the IR signal and delivers an amplified version to the ears of a listener. Ordinarily, strict line-of-sight is necessary between an IR emitter and the transparent lens on the receiver, but this can be modified in rooms with light-colored surfaces (the IR waves are reflected off them) or by adding additional emitters. Since IR systems are light waves, they exhibit the advantages and disadvantages of light waves. The IR signals are contained within a room, thus ensuring privacy, and adjacent rooms in a facility can use IR systems without fear of inter-room interference. They are also not as subject to radio or electromagnetic interference as are FM systems. However, outdoor use is problematic because of the effect of sunlight (which contains a great deal of infrared energy) and it is more difficult to cover the largest venues with IR systems than with an FM system.

All IR systems require a radio-frequency (RF) sub-carrier as an intervening step between the audio and the light waves. That is, the audio signals first modulate the RF sub-carrier, which in turn modulates the IR light signals. Until now, 95 kHz has been the unofficial RF sub-carrier, permitting a person to use the same IR receiver in different venues. Compatibility between venues has always been a major advantage of IR systems. The situation may now be changing because of the electromagnetic interference at this frequency produced by newer, more energy efficient, fluorescent lights. Because of this, some facilities are or may be switching to different sub-carrier frequencies (250 kHz, 2.3 MHz) with their IR systems. This will not be a problem for consumers as long as the facility provides them with compatible IR receivers. However, switching sub-carrier frequencies may affect those

Figure 7: Coupling a hearing aid to an ALS by placing the headphone over the hearing aid while it is switched to the "T" setting.

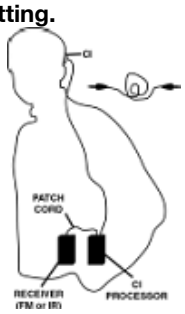

Figure 8: Coupling a cochlear implant to an ALS using a patch cord.

DOJ Title II rule
DEPARTMENT OF JUSTICE
28 CFR PART 35
Nondiscrimination on the Basis of Disability in State and Local Government Services
Subpart A -- General
35.104 Definitions
Auxiliary aids and services includes—

(1) Qualified interpreters, notetakers, transcription services, written materials, telephone handset amplifiers, assistive listening devices, assistive listening systems, telephones compatible with hearing aids, closed caption decoders, open and closed captioning, telecommunications devices for deaf persons (TDD's), videotext displays, or other effective methods of making aurally delivered materials available to individuals with hearing impairments.

Subpart E – Communications
35.160 General.
(a) A public entity shall take appropriate steps to ensure that communications with applicants, participants, and members of the public with disabilities are as effective as communications with others.

(b)(1) A public entity shall furnish appropriate auxiliary aids and services where necessary to afford an individual with a disability an equal opportunity to participate in, and enjoy the benefits, of a service, program, or activity conducted by a public entity.

(2) In determining what type of auxiliary aids and service is necessary, a public entity shall give primary consideration to the requests of the individual with disabilities.

consumers who have, or desire to purchase a personal IR receiver, since no commercially available IR receivers are able to detect all the possible sub-carrier frequencies.

What principles govern the selection of ALSs for specific venues?
It is always a good idea for the installer (or the equipment distributor) to consult with the provider prior to the selection and installation of an ALS. Whenever possible, a preliminary visit to the facility is advisable. At the least, the installer should obtain a detailed description of the facility, its operation, and its unique needs prior to decision-making. Below are just some of the considerations that should be jointly considered:

- Is privacy a major consideration? Is it necessary that the events taking place within a facility not be accessible to people outside the enclosure? If so, then an IR system must be employed. There are really no other alternatives for facilities such as courtrooms, confidential meeting venues, and even musical performance facilities where "bootlegging" a recording may be attempted.
- Is this an outdoor facility (an amphitheater with lawn seating or a racetrack, for example)? In this case, an FM system would be the appropriate choice.
- Is this a large indoor facility, such as a concert hall or auditorium with balconies, overhangs, and other nooks and crannies? While a skilled person can satisfactorily install an IR system in such locations (and it should not be ruled out), it is easier to ensure adequate signal strength at all seat locations with an FM system. However, this choice will be influenced by the possible presence of electromagnetic interference from outside sources, requiring shielding, or the possibility of interfering with nearby external users of radio systems, such as hospitals and public safety organizations.
- Are a large number of simultaneous events going to be taking place in adjoining facilities? While there are a sufficient number of potential FM carrier frequencies available to ensure non-interference between rooms, and thus an FM system is a possibility, it may then be necessary to provide FM receivers that can be tuned to all the possible frequencies or to match supplies of receivers to particular rooms. How will the audience respond to the necessity to change frequencies? Will it cause difficulties if someone in one room can "tune in" to events in a different room? If these possibilities may turn into future problems, then an IR system is advisable. IR systems can be installed in every room in a facility with no interference between rooms. Furthermore, the same IR receiver can be used in every room.
- Is it going to be necessary to use the same system alternately in a number of different rooms (such as in a community center, switching from one activity room to another)? Ordinarily, FM systems are somewhat more flexible and can be used both indoors and out (as in a tour group). However, some IR systems are also relatively easy to deploy, and portable units will work well in the smaller activity rooms, though they will not operate as effectively outdoors.
- Is there a possibility of radio interference within the auditory assistance FM frequencies (72-75 MHz and 216-217 MHz bands)? This can be determined by using a frequency scanner to determine the possibility of interference prior to the installation. If the interference is likely to persist, and this is not amenable to a change in carrier frequency (which most problems would be) or shielding, then an IR system would be the best bet.

Except for a few specialized locations (like schools for the deaf), IL systems are rarely used in large listening venues. This is ironic, since of all the ALSs, they are probably -- from the viewpoint of the facility -- the simplest system to provide. The IL receiver is simply the telecoil in the person's own hearing aid, thus relieving the facility of the necessity to supply and care for a large number of receivers. Specialized IL receivers with telecoils are available for people who wear hearing aids without telecoils (and for those with mild hearing loss who wear no hearing aids at all).

What possible problems should I be aware of?
There are two types of problems to be considered, one type at the time of installation and the other that may occur later. The presence of interfering radio signals, in the event of an FM installation, or interference from fluorescent ballasts with an IR installation, are examples of the first type of problem apparent at the time the ALS is being installed. In some locations, it may be desirable to monitor the presence of potential radio interference for some period of time, and to do this throughout the facility, before making an FM installation. A frequency scanner would be a useful device to employ. These problems can be managed before the system is put into operation. When extraneous radio signals of particular frequencies are found to occur often, the installer has the option of shifting to another radio frequency.

AND TITLE III:
PART 36 NONDISCRIMINATION ON THE BASIS OF DISABILITY BY PUBLIC ACCOMMODATIONS AND IN COMMERCIAL FACILITIES
36.303 Auxiliary aids and services.
(a)General. A public accommodation shall take those steps that may be necessary to ensure that no individual with a disability is excluded, denied services, segregated or otherwise treated differently than other individuals because of the absence of auxiliary aids and services, unless the public accommodations can demonstrate taking those steps would fundamentally alter the nature of the goods, services, facilities, privileges, advantages or accommodations being offered or would result in an undue burden, i.e., significant difficulty or expense.

(b) Examples. The term "auxiliary aids and services" includes – (1) Qualified interpreters, notetakers, computer-aided transcription services, written materials, telephone handset amplifiers, assistive listening devices, assistive listening systems, telephones compatible with hearing aids, closed caption decoders, open and closed captioning, telecommunications devices for deaf persons (TDD's), videotext displays, or other effective methods of making aurally delivered materials available to individuals with hearing impairments;

[…]

(c) Effective communication. A public accommodation shall furnish appropriate auxiliary aids and services where necessary to ensure effective communication with individuals with disabilities.

The second type of problem is one that often bedevils installers (as well as providers and consumers). Some period after making what they believed to be an excellent installation, they may get calls from an irate provider who reports that their patrons are complaining of poor or non-existent reception. After visiting the facility and troubleshooting the problem, the installer may find:

- IR emitters moved from their previous location because some maintenance person or stage designer felt that they were intrusive in a particular location.
- Scenery, curtains, or some other fixture placed between the audience and an emitter and thus "shadowing" some of the IR light waves.
- Transmitter system settings modified from the original ones (e.g., VU meter readings below optimum level).
- Radio or electromagnetic interference from an adjacent facility, or from within the facility, not present during original installation.
- Maintenance problems with the receivers (dead batteries, broken cords, poor connectors, etc.).
- Some change in microphone usage (i.e., number, location, type) which severely affects the quality of the signals reaching the microphones.

The solutions in these examples are obvious. Facility personnel must understand that the ALS installation is a permanent addition to the venue, not to be tampered with for any reason, and how it works with the basic sound system. The quality of an ALS installation can be compromised at any point in the transmission path by what may appear to be a simple adjustment or change of some kind. When problems occur subsequent to the original installation and the problems rectified, the technician should retest the system to ensure that the electroacoustic targets are once again being met.

The Rehabilitation Engineering Research Center on Hearing Enhancement, website www.hearingresearch.org, has a great deal of useful information on assistive listening systems. Other resources include the technical assistance center at Gallaudet University, www.gallaudet.edu, and the Access Board, www.access-board.gov. The Access Board also provides a toll-free technical assistance number at (800) 872-2253 (voice) or (800) 993-2822 (TTY).

This technical assistance is intended solely as informal guidance; it is not a determination of the legal rights or responsibilities of entities subject to the ADA.

August 2003

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