Serving Passengers with Hearing Loss

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Above: A commuter with hearing loss waits for his train to arrive. But, for people with his disability, navigating noisy transportation venues can be daunting. Assistive listening systems (or hearing loops)—technology that has been around since 1937—make maneuvering easier. Today, airports, rail systems, and taxicabs are picking up the pace to incorporate such hearing loops into their operations.

Years ago, Howard (Rocky) Stone, the founder of the Hearing Loss Association of America (HLAA), popularized the notion that hearing loss is an invisible disability experienced today by more than 48 million Americans. People with hearing loss do not use wheelchairs or crutches, and many don't have the training to communicate using sign language.

The National Institute on Deafness and Other Communication Disorders (NIDCD) reports that nearly two-thirds of people with hearing loss—about 28.8 million people—could benefit from using hearing aids (*1*; Figure 1). Further, roughly 2 percent of adults ages 45 to 54 have disabling hearing loss, reports the NIDCD; this figure grows to 8.5 percent for those ages 55 to 64 and up to 25 percent for ages 65 to 74 (*1*). Reporting statistics on the Hearing Industries Association's most recent MarkeTrak survey, *The Hearing Review* stated that, over the past 30 years, the percentage of people with self-reported hearing loss who own hearing aids has increased from just under 23 percent to more than 34 percent (*2*).

For those with hearing loss, passage through a transportation terminal is fraught with difficulty: Hearing aids often are unable to suppress background noise adequately, and the typical cacophony of a terminal can make speech comprehension anywhere from challenging to impossible.

Announcements about a gate change, departure delay, or other critical information made over a bus terminal's or airport's public address (PA) system, can be lost under the drone of the ventilation system, people's voices, rolling luggage, and other sounds that are nearly always present in such spaces. Therefore, people with hearing loss must often rely on note-passing or strangers to communicate with an agent at the ticket counter; if these methods are not available, not only misunderstandings but also missed departures can occur.

By themselves, simple hearing aids are not a solution to this problem, because

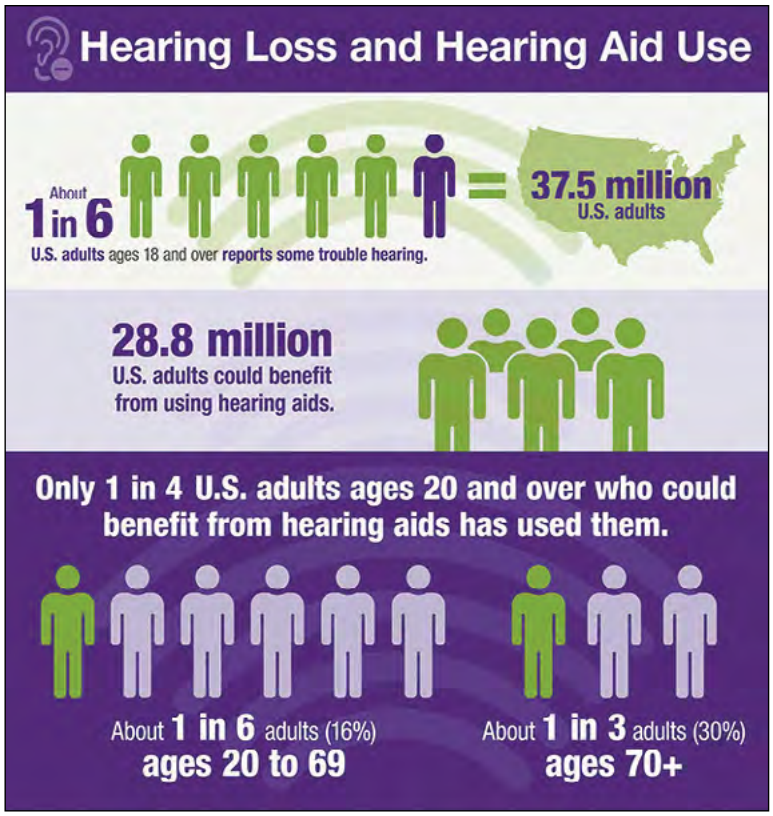

FIGURE 1 Hearing loss and hearing aid use. (Source: National Institute on Deafness and Other Communication Disorders, National Institutes of Health.)

often they are not able to adequately block the speech-covering sounds of the typical terminal concourse that make it difficult or impossible to identify consonants and to tell the difference between words such as "gate" and "late."

Researchers at the Institute of Hearing Research note that "the ability to hear and understand speech in the presence of background noise is highly dependent on the speech-to-noise ratio (SNR), that is, the level of the speech relative to the level of the background noise" (*3*). Hearing care providers are taught that for those who have normal hearing, a 10-decibel difference is considered an acceptable SNR (*4*). For those who have hearing loss, however, the SNR often must be 20 decibels—or even as much as 25 decibels—for adequate comprehension of what the speaker is saying. That means background noise should not exceed 55 decibels for those with normal hearing to carry on a conversation without raising their voices—but that the background noise might have to be as low as 40 decibels for a person with even moderate hearing loss to hear and understand a speaker whose voice measures 65 decibels.

In *Airport Cooperative Research Program (ACRP) Research Report 175: Improving Intelligibility of Airport Terminal Public Address Systems*, researchers state that a typical daytime sound level reading in a hub airport concourse ranges from 67 to 72 decibels (*5*). At a gate, this level can be as high as 79 decibels. A speaker's voice would have to be well above the normal level even for a person with normal hearing to hear and understand at such a gate. Hearing aids raise not just a speaker's voice but also the background noise—therefore, even with hearing aids, a person with hearing loss could not hear with noise levels at that magnitude.

If the person is in an airport and a speaker is wearing a face mask, even a modest 50-decibel background noise level often makes hearing more difficult. *The Hearing Review* reports that the typical mask reduces the volume of a user's speech by up to 3 decibels and up to 10

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The vaulted ceilings at the Ronald Reagan Washington National Airport in the District of Columbia cause echoes and a noisy environment. A typical daytime sound-level reading in a hub airport concourse ranges from 67 to 72 decibels—about the same level as a running washing machine.

Photo: Melinda Young Stuart, Flickr

A sign reminds customers to speak up when checking out at a store. A face mask can reduce the volume of a user's speech by up to 50 percent; in an area with a lot of background noise, this poses difficulties for people who are hard of hearing.

decibels if the speaker is wearing an N95 mask; this represents a 50 percent reduction in volume (*6*).

Hearing Loops

More and more transportation centers and other places of public assembly are turning to an old, yet effective, technology to address these communication problems: audio frequency induction loop systems, also called "hearing loops." In settings applicable to transportation, a hearing loop is an assistive listening system (ALS) connected to a venue's PA system that relays that system's signal to a copper wire laid out in a loop or grid pattern on the floor or in the ceiling. The copper loop then broadcasts the PA system's sound as a silent, electromagnetic signal. Tiny coils—found in 70 percent of current hearing aid models and in most cochlear implant processors—receive that signal, and the hearing aids or cochlear implant processors turn it back into sound.

Called telecoils, these receivers are activated by a T-switch on the device or its remote control, and the sound level can be adjusted by using the volume control in the same way. It usually is possible to turn the telecoils on and the microphone off on hearing aids or in a cochlear implant, so the only sound relayed is the feed from the PA system. Doing this eliminates much ambient noise, improving the SNR and making speech more comprehensible. Another form of hearing loops is counter loops, which may be built into a counter, and invisible, or self-contained, free-standing units.[1]

HISTORY

Hearing loops were invented and developed in Great Britain. Electromagnetic induction was discovered by British scientist Michael Faraday in 1831, but it was not developed for assistive listening until 1937, when Russian-born British telephone and sound engineer Joseph Poliakoff invented the first electromagnetic induction loop system. One year later, the first wearable hearing aid with a telecoil—worn in a chest pocket—was made by the Multitone Electric Company in England. Today, the United Kingdom is one of the world's largest producers of hearing loop equipment. The technology can be found throughout the country: in transportation terminals, places of worship, theaters, meeting halls, the London Underground, and even in London's signature black taxicabs.

[1] This statement was taken from a report by hearing loop maker Williams AV and cites data from the International Hearing Loop Manufacturers Association stating that hearing loops "can boost comprehension from roughly 10 percent to as much as 90 percent." To read the article, visit https://williamsav.com/airports-must-consider-how-hearing-loss-affects-travelers-business-and-flight-schedules.

Loops and telecoils are different from Bluetooth, a wireless technology found in many hearing aids that allows users to connect their hearing aids remotely to a telephone, computer, or microphone but that cannot serve groups of people. The hearing loop signal, on the other hand, can be accessed by an unlimited number of people, as long as they have a telecoil-equipped receiver via hearing aids, cochlear implants, or portable loop receivers and earphones.

AMERICANS WITH DISABILITIES ACT

The Americans with Disabilities Act of 1990 (ADA) addressed accommodations for the communication needs of people with hearing loss. Revisions in 2010 added more hearing-disabled accommodations by requiring hearing aid–compatible ALSs for theaters, legislative chambers, and other "places of assembly" if they are served by a PA system. Loops offer the only technology that currently meets all the ADA requirements. FM, infrared, or WiFi systems meet these requirements only if they offer users a choice of earphones or neckloops coupled with a venue-loaned receiver—but such devices would not be a

Photo: Wikimedia Commons

Wireless hands-free devices for hearing aid users that operate via FM, infrared, or Bluetooth systems meet ADA requirements if they offer users earphones or neckloops; this is workable in some venues, but not in transportation hubs.

workable ALS in transportation terminals. The ADA does not require hearing loops in facilities like travel terminals, but hearing loops are being installed voluntarily to make the travel experience less stressful for those with hearing loss.

Airports

In the United States, hearing loops increasingly are used in airports at ticket and at rental counters, information centers, departure gates, and baggage claims. More than a decade ago, the Gerald R. Ford International Airport in Grand Rapids, Michigan, became the country's first looped airport (*7*). Today, 18 other airports are looped as well, such as Wittman Regional Airport in Oshkosh, Wisconsin, and Phoenix Sky Harbor International Airport in Arizona. Hearing loops also are planned in the new concourse at Memphis International Airport in Tennessee and the car rental center currently under construction at Los Angeles International Airport.

Last March, the Port Authority of New York and New Jersey announced new accessibility requirements that mandate the installation of hearing loops at departure gates and information counters in all new or significantly upgraded airports. The mandate also applies to information counters at all train, bus, and ferry terminals under the Port Authority's management.

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Even before the Port Authority's mandate, all departure gates at the recently completed Delta Air Lines terminal at LaGuardia Airport were fitted with hearing loops, as some of Delta's gates in Michigan's Detroit Metro Airport and the Minneapolis–Saint Paul International Airport in Minnesota have been.

In addition, the information counters at Georgia's Hartsfield–Jackson Atlanta International Airport utilize the technology. Global examples include Muscat International Airport in Oman, where 300 counter loops have been installed throughout the terminal. At Charles de Gaulle Airport in Paris, the waiting and customer assistance areas in each terminal are equipped with hearing loops. Hearing loops are placed in a variety of locations at the Adolfo Suárez Madrid–Barajas Airport in Spain; Incheon International Airport in Seoul, South Korea; and all of the international airports in Australia. Also in Australia, the Digital Bus Stop Totems in Adelaide are fitted with hearing loops to relay aural announcements in addition to those via text.

Rail Travel

The rail and transit industries are utilizing hearing loop technology in a variety of contexts, as well. More than 600 of New York City's Metropolitan Transit Authority (MTA) subway information booths feature counter loops that enable users to communicate with the agent in the booth, even as express trains rumble underneath. The MTA has issued a request for proposals for more than 1,000 new hearing loop–equipped subway cars, and loops are being tested on subway boarding platforms.

After a similar test at Bay Area Rapid Transit's (BART's) Fremont Station platform, the *San Francisco Chronicle* reported one hard-of-hearing commuter at that station saying, "Oh, my goodness. 'Do not board'— I heard that!'" after she heard via

Photo: avlxyz, Flickr

Hearing loops appear in bus and train facilities throughout Australia, including in a Metlink (now Public Transport Victoria) station in Melbourne.

Photo: Melinda Young Stuart, Flickr

Bay Area Rapid Transit deployed new cars that include a hearing loop among their features, helping passengers who are hard of hearing to catch announcements during their ride.

the telecoils in her hearing aids that the train at her platform was out of service (*8*). The rider went on to say: "I never would have heard that." A symbol is visible in all new BART train cars that have hearing loops installed (see page 28).

As part of a $7.3 billion contract with Siemens Mobility, Amtrak recently announced the purchase of 83 new trainsets (approximately 500 cars total) that feature hearing loops (*9*). The deal includes an option for 130 additional trainsets, as Amtrak implements a growth plan that adds 160 new communities to the 525 that it currently serves. Some Amtrak ticket and information booths have been looped at Grand Central and Penn Stations in New York City and at Union Station ticket counters in Washington, D.C.

At the Milwaukee Intermodal Station in Wisconsin, the passenger concourse was looped to serve the hard of hearing among its nearly 2,000 local and long-distance bus and train passengers each day. Among the communication access recommendations under consideration by the U.S. Access Board is the inclusion of a requirement that hearing loops be installed in all new rail cars that are also fitted with PA systems.

Buses

Many bus systems have implemented the loop technology. The local bus service in Seattle, Washington, has addressed the needs of the hard of hearing in its King County Metro Customer Service Office, where a hearing loop was installed at the service counter for customers who rely on hearing aids or cochlear implants. Indian Trails, Inc., with help from the Michigan Department of Transportation, installed hearing loops in their fleet of 17 motorcoaches that serves 34 routes in the state's Upper and Lower Peninsulas and in neighboring Wisconsin.

In addition, New York MTA is testing buses fitted with hearing loops. An HLAA volunteer who helped evaluate a couple of loop-equipped buses reported: "We were able to hear announcements from both the bus driver (live) and from outside (recorded). The sound quality varied between the two sources, but both were pretty good."

In London, such buses have been in service for some time.

Photo courtesy Stephen O. Frazier

The international hearing loop symbol, seen on the outside of this New York City taxicab, alerts passengers that the cab features hearing loop technology.

Taxicabs

For years, London taxis have been equipped with hearing loops to facilitate better communication between the driver and backseat passengers. The New York Taxi and Limousine Commission was encouraged by looping advocates to do the same, and now all new taxis in New York are delivered with a hearing loop installed. Signs inside the taxicab alert backseat passengers to the presence of the loop and how to use it. Many cabs also carry the international hearing loop symbol on the outside of the cab, like the one shown in the photo above.

Down the Road

Some of the loop installations noted in this article—the looping of Indian Trails buses and the Gerald R. Ford International Airport, both in Michigan—began more than a decade ago. Others, like the Delta terminal at LaGuardia Airport or the Amtrak train loop initiative, are very recent.

The "Get in the Hearing Loop" initiative, started by HLAA and the American Academy of Audiology in 2010, has played a significant role in this revolution in communication access. The work of New Yorker Janice Schacter Lintz and her Hearing Access and Innovations Program also has been enormously effective. The looping campaign of the nation's Sertoma clubs, "A Sound Investment," has contributed financial and other support in communities throughout the nation.

The efforts of independent hearing loop advocacy groups, like the Adult Loss of Hearing Association in Tucson, Arizona, or Loop Minnesota in Minneapolis, are evident nationwide. These groups and other looping advocates share the hope that, at some point, it won't be necessary for people to ask: "What's a hearing loop?"

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