Loop 101: Highway to Hearing
(Paving the Way to Hearing)

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First, Some Numbers

- More than 1.1 million Arizonans are hard of hearing
- More than 739,000 Arizonans over the age of 60 are hard of hearing
- More than 20,000 people in Arizona are culturally Deaf
- Nearly 2 out of 1,000 babies in Arizona are born with hearing loss
- 20% of teenagers have some degree of hearing loss
How We Hear

1. Eardrum
2. Malleus
3. Incus
4. Stapes
5. Semicircular canals
6. Auditory nerve
7. Facial Nerve
8. Vestibular nerve
9. Cochlea
10. Eustachian tube
But It’s Hard to Hear!

- Acoustics
- Background Noise
- Fans/AC
- Objects interfering with the speaker (walls)
- Lighting
- Too far away from the source of sound
- Seating
So We Sometimes Use Devices

- BlueEar protocol
- Wireless audio distribution
- Gateway
- Amplification
- Alert Data transmission
- External transmitter antenna - outside the skin
- External magnet - outside the skin
- Internal magnet, antenna and receiver/stimulator - under skin
- Microphone
- Processor/battery
- Electrode
But...Distance!

- As speech leaves the talker’s mouth and crosses the room to the listener, it becomes softer and softer and might not be sufficiently audible at the listener’s ears, even with hearing aids or cochlear implants.

Illustration courtesy Cynthia Compton-Conley, Ph.D. © 2010
And...Ambient Noise!
(also known as background noise) can be caused by various sources.

- Heating/AC System Noise
- Children
- Talking
- Coughing
- Noises of seats, footsteps

(Also known as background noise)
**Plus, Reverberation** The sound bouncing off walls and ceilings and other objects in the room causing what is described as an “echo.”
The compounding effects of distance, noise and reverberation

- Here is a visual representation of how speech becomes softer at the listener’s ears, mixed the ambient noise, and both the speech and noise are smeared, rendering understanding difficult to impossible.
Cynthia Compton-Conley has said you can think of assistive listening devices as “binoculars for the ears.” Just as binoculars magnify a distant image, bringing its details closer to your eyes so you can see it better, assistive listening devices catch the desired sound from a distance and sends it directly to your ears, preserving its loudness and quality despite poor room acoustics.
PSAPs: e.g. Pocketalker Listening Device

- A portable, battery-operated personal amplification system where a microphone is placed near the sound to be heard and headphones can be worn.
- It amplifies and clarifies the sound
- 2 AAA batteries last 100 hours
FM Listening Devices

- FM systems use radio waves, just like your radio, and can be encrypted for privacy & security.
- They work much like a radio station; one part (the transmitter) uses microphone to hear and transmit the sound into the air; the other part (the receiver) receives the sound and amplifies and clarifies it.
- Wireless, battery-operated
- 1:1 or large area
Infrared Listening Devices

Infrared uses light to transmit sound, doesn’t work outside, isn’t a secure (encrypted) transmission. Wireless, battery operated, 1:1 or large area.

“Stethoscope Style” goes into ear canals

Large Area (theatre auditorium, movie theatre, etc)
Infrared System has headphones or neckloops
FM & Infrared
Device Drawback

Listener must always arrive early to borrow a receiver from the public venue...if they have any left!
Why Don’t We All Just “Get in the Loop?”
Telecoils in HA/CI receive loop signals

- Tiny metal rod surrounded by coils of copper wire in most hearing aids and all cochlear implants.

- Designed to receive electromagnetic energy emitted by loops and from hearing aid compatible telephones.

- It then converts it to electrical energy which is processed by the hearing aid or cochlear implant.

- The sound heard by the individual is already corrected by the hearing aid to match the wearer’s hearing needs.
Unlike FM and infrared listening systems, loop systems that broadcast to hearing aids

1) *Require no pick up/return* of portable receiving units and headsets
2) *Require fewer portable receiving units* (and batteries)
3) *Operate on a universal frequency* (FM systems operate on differing frequencies, requiring receivers for each venue)
4) Are *inconspicuous*: No need to visually announce “I am HOH!”—an invisible solution to an invisible problem
5) *Work in transient situations* (can serve the HOH at ticket counters, teller windows, drive-through stations, airports, etc.)
Unlike FM and infrared listening systems, loop systems that broadcast to hearing aids

6) *Entail no hygienic concerns* regarding ear buds
7) *Are hearing aid compatible:* Do not require putting ALD on/off (e.g., church sermon/singing)
8) *Flexible use:* Can allow either direct listening (*M*=mic) or loop broadcast (*T*=telecoil) modes, or both
9) *Deliver personalized in-the-ear sound* . . . customized by one’s own hearing aids to address one’s own hearing loss
10) Are, therefore, *much more likely to be used* . . . and to be increasingly used, once installed.
Know Your Telecoils: Two Types

1. Manual – you turn it on via a switch or button.
2. Automatic – automatically activated when you place your hearing instrument near a hearing aid compatible phone.
Know what type of telecoil and features you need – and when

<table>
<thead>
<tr>
<th>SETTING</th>
<th>WHAT IT MEANS</th>
<th>PROs</th>
<th>CONs</th>
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</thead>
<tbody>
<tr>
<td>T Only</td>
<td>Telecoil on; microphone off</td>
<td>Allows you to hear through ALDs and nothing else; good in noisy settings</td>
<td>Cannot monitor your own voice</td>
</tr>
<tr>
<td>M + T</td>
<td>Microphone and Telecoil on</td>
<td>Allows you to hear through ALDs AND HAs; Allows you to monitor your own voice and to hear seatmate.</td>
<td>Might be distracting in noisy settings.</td>
</tr>
<tr>
<td>Auto-T</td>
<td>Automatic Telecoil</td>
<td>Allows you to hear on Hearing aid compatible phone</td>
<td>Will not work with loops, FM, IR without a manual override</td>
</tr>
</tbody>
</table>
Questions for your hearing care provider:

- Do my hearing instruments have telecoils?
- Have they been activated?
- Have they been programmed (adjusted) for hearing loop use?
- Are they in good working order?
- How do I turn them on?
- Can my hearing instruments be retrofitted with telecoils?
But What if I Don’t Have a T-Coil?

Consistent with the Americans with Disabilities Act (ADA), complimentary loop receiver listening devices are available at all looped venues.

Photo courtesy of Steve Frazier.
Loops I Brought Today

- Looped Clipboard
- Counter top Loop
- Silhouette
- Chair Loop Pad
- Neckloop
Looping a Room

Direct connection for the hearing impaired

An induction loop system turns hearing aids into loudspeakers, delivering sound right into the ear.

**HOW IT WORKS**

1. **Person speaks into a microphone**

2. Current is amplified and sent to a magnetic cable loop surrounding the listeners, creating a zone.

3. A magnetic field delivers the amplified, high-quality signal to the listener’s hearing aid.

**Cable loop**

*Can be placed*

*Above*

*Never at hearing aid level*

*Below*

Telecoil picks up the magnetic field signal.

**SOURCE:** Ampetronic
Room Loop Signage

- Look for this symbol in any public venue. It indicates the presence of a hearing loop and prompts those with telecoils to turn them on.
- If listeners do not have telecoil-equipped hearing instruments, it alerts them to borrow a headset.
- Keep in mind that if a person’s hearing loss is too severe, the headset will not provide sufficient audibility for understanding.
The U. S. Congress is looped – and the Arizona State Capitol, Senate, House, Floors, Galleries, & Meeting Rooms!!
Looping A TV

Looping your living room helps improve TV listening.

- You can still hear environmental sounds (i.e., spouse, doorbell, etc.).
- You don’t lose the sound if someone walks between you and the TV.
- You can sit anywhere in the room and still hear the TV.
- The TV sound is customized to your hearing aids.
Loops can also be used in the workplace

The loop can be placed:

- Under wall-to-wall carpeting
- Under an area rug
- Under a baseboard
- On top of the baseboard and over door moldings
- Under the room in a crawl space or basement
- In an attic

AND........
In waiting rooms and offices
Elevators, NYC subway station, NYC taxi cabs
Transportation hubs

Penn Station
New York City

Union Station
Washington, DC
Transportation hubs

Gerald R. Ford International Airport
Michigan

Milwaukee Intermodal Station

Soon: Sky Harbor Terminal 3 Gates Will Be Looped!!
Amusement parks, museums, and other cultural venues

Disney World

Metropolitan Museum
New York City

Tour Bus at
Bronx Botanical Gardens
New York City
Banks and retail stores
Looping Apps!

Resources

• http://www.hearingloss.org/content/loop-resources
• https://www.youtube.com/watch?v=_3XoVrUjfaY  
  Hearing Loop Demonstration by J. Sterkens
• https://www.youtube.com/watch?v=Ahbz0VvlZF0&feature=youtu.be  Hearing Loop Demonstration by R. Einhorn
• And resources on next slide...
Resources & Many Thanks:

• HLAA, www.hearingloss.org

• Dr. Cynthia Compton-Conley, https://www.audiology.org/about-us/academy-information/academy-honors/cynthia-compton-conley-phd

• Dr. Juliette Sterkens, http://www.foxvalleyhearingloop.com/

• Dr. David Myers, www.hearingloop.org

• Mr. Steve Frazier, http://www.loopnm.com/