ADA Audio Conference Series
August 26, 2014

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- You may type and submit questions in the Chat Area Text Box or press Control-M and enter text in the Chat Area. You will not be able to see the question after you submit it but it will be viewable by the presenters.
- If you are connected via a mobile device you may submit questions in the chat area within the App.
- If you are listening by phone you will be instructed by the Operator on how to ask questions.
- Questions may also be emailed to webinars@ada-audio.org

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- Resize the Whiteboard where the Presentation slides are shown to make it smaller or larger by choosing from the drop down menu located above and to the left of the whiteboard. The default is “fit page”
**Customize Your View continued**

- Resize/Reposition the Chat, Participant and Audio & Video panels by “detaching” and using your mouse to reposition or “stretch/shrink”. Each panel may be detached using the icon in the upper right corner of each panel.

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- If you experience any technical difficulties during today’s session:
  1. **In webinar platform**: Send a private chat message to the host by double clicking “Great Lakes ADA” in the participant list. A tab titled “Great Lakes ADA” will appear in the chat panel. Type your comment in the text box and “enter” (Keyboard - F6, Arrow up or down to locate “Great Lakes ADA” and select to send a message); or
  2. **By Email** webinars@ada-audio.org; or
  3. **Call** 877-232-1990 (V/TTY)

**Helping People with Hearing Loss**

*Hear in Public Places*

*Through the use of Hearing Loop Technology*
Presenter

Don Bataille, AIA CCS

Bachelor of Architecture - University of Kentucky
Past President - Hearing Loss Association of America, Rochester NY Chapter
Hearing Aid user since 1994 for sudden & progressive hearing loss
Promotes better workplace acoustics through his “Hear to Work” series of workshops at 2007, 2008, and 2009 HLAA National Conventions
Recipient Hearing Loss Association of America Presidents Award

Juliette Sterkens, AuD

Doctor of Audiology - Arizona School of Health Sciences
HLAA Hearing Loop Advocate
Recently retired from private practice in Oshkosh WI after 30+ years
Recipient of multiple professional awards for advocacy efforts on a state, national and international level
Fostered nearly 400 hearing loop installations in Wisconsin
Grew up with father who suffered significant HL while in military service

Topics Covered:

- Hearing Loss / benefits & limitations of hearing instruments
- Why loops are user preferred
- Review ADA & IEC Standard
- Myths and Truths of hearing loops
- Vetting Hearing Loop Installers
- Questions & answers
Prevalence of Hearing Loss in the United States, 2001-2008

Hearing loss defined as a better-ear PTA of 0.5-4kHz tones > 25 dB

Lin et al., Arch Int Med. 2011

Hearing thresholds changes over time
Males vs. Females

Men
Women

Age 25
Age 65

What Hearing Loss might look like Visually

Perfect hearing looks like this.

Impaired hearing looks like this.
The number of people with Hearing Loss is expected to increase

Changing US demographics - Baby Boomers

- Nearly 70 Million will turn 65 to 85 by 2030
- High incidence of Noise Induced Hearing Loss
- “Aging in Place” Movement

Benefits of Hearing Instruments

- Increase audibility of all sounds
  (But hearing devices don’t “know” which sounds are the most important for the user)
- Improve hearing in quiet environments
  (But less so for those with more severe hearing loss)
- Improve communication in 1:1 situations and small groups
- Improve quality of life
  1999 Study by Nat’l Council on Aging: Untreated Hearing Loss Linked to Depression, Social Isolation in Seniors

Limitations of Hearing Instruments

- Used Alone, Hearing Aids Fail to Deliver
- Hearing instruments do not work well in difficult listening environments
- Individuals with hearing loss need +15-25 dB SNR
- Hearing Instruments provide, roughly, +5 dB SNR
- Hearing instrument in a classroom (demo)
HLAA/AAA Surveys 556
HI and CI Users (2006)

Are you more satisfied with your hearing aid(s) or CI(s) after using them with a hearing loop?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>88.30%</td>
<td>11.70%</td>
</tr>
</tbody>
</table>

Hearing Instrument Users’ Perspective on Loops

I used to detest my hearing aids, but now that they serve this second purpose, I love the way they’ve enriched my life.

My son comments when he uses a loop he’s able to hear the play without needing to watch the captions.

It was truly one of my most memorable moments in my life and I felt “normal”.

Hearing Loops: Greatly improve functionality of hearing aids.

This was the first time I’ve heard a sermon in years! I am amazed at the sound quality. I was a teenager when I last heard this well.
Audiologists' Perspective on Loops

This is good news for the hearing industry: the greater the functionality and satisfaction with hearing instruments, the more likely people are to buy them.

Hearing Loops reduce the barriers to access that many people with hearing loss experience on a daily basis.

Audiologists' Perspective on Loops

Loops Promote:
- Satisfied hearing instrument users
- Improved quality of life
- Increased referrals
- Loyal clients

Audiologist Dr. Bill Diles

Hearing Loops Improve SNR Wirelessly

Person with T-coil equipped hearing device sits inside the hearing loop

Sound (Voice from lecturer) -> Microphone -> Hearing Loop Amplifier -> Loop wire -> 1 coil in hearing device
Hearing Loops Improve SNR Wirelessly

Person with T-coil equipped hearing device sits inside the hearing loop

Sound (Voice from lecturers) → Microphone → Signal to Noise improvement of 10-25 dB → T-coil in Hearing Device

All that is needed to hear in a Loop: Hearing device w/ a telecoil

- Estimated at 40% of all instruments on market & on the increase
- Newer devices (within last 4 yrs.) >60%
- 100% of Cochlear Implants
- Some MFRs offer telecoils in streamers or remote controls

How do you now if a hearing aid is equipped with a telecoil?

Multimemory Button

Program Button
Compare Loop to FM or Infrared

Sound recordings & Spectrograms (Out vs. In Loop)

On a scale from 1 to 10 rate your ability to hear in the venue using your hearing devices only (no telecoil)?

1 = "I heard nothing"  10 = "I heard every word"

Heard nothing 1 2 3 4 5 6 7 8 9

Heard every word 10

n=786
Average=4.90

14% of respondents indicated their listening experience was an 8, 9 or 10
On a scale of 1 to 10, rate your ability to hear in the venue using the Telecoil in the Loop?
1 = "I heard nothing"  10 = "I heard every word"

- Heard nothing: 1
- Heard nothing: 2
- Heard nothing: 3
- Heard nothing: 4
- Heard nothing: 5
- Heard nothing: 6
- Heard nothing: 7
- Heard nothing: 8
- Heard nothing: 9
- Heard every word: 10

n=786
Average = 8.46

Over 85% of respondents indicated their listening experience in the loop equaled an 8, 9 or 10.

When offered assistive technology which do you prefer?
- FM/IR with headphones
- FM/IR with neckloop
- A hearing loop with own hearing devices

n=218

Most Preferred
- FM/IR with headphones: 6
- FM/IR with neckloop: 26
- Hearing Loop with own hearing devices: 177

Would you be more likely to purchase tickets to attend local entertainment, such as movies and live theatre, if hearing loop assistance is provided?

- Extremely likely
- Very Likely
- Moderately Likely
- Slightly Likely
- Not at all Likely

n=208
In large venues such as auditoriums, meeting rooms, movie theaters etc. rate the following hearing assist technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Most Preferred</th>
<th>Somewhat Preferred</th>
<th>Do Not Prefer</th>
<th>Never Used</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM/IR with Headset</td>
<td>3%</td>
<td>10%</td>
<td>48%</td>
<td>39%</td>
<td>218</td>
</tr>
<tr>
<td>FM/IR with Neckloop</td>
<td>12%</td>
<td>30%</td>
<td>25%</td>
<td>33%</td>
<td>218</td>
</tr>
<tr>
<td>Hearing Loop with Own</td>
<td>81%</td>
<td>7%</td>
<td>6%</td>
<td></td>
<td>218</td>
</tr>
</tbody>
</table>

2010 ADA STANDARDS For ACCESSIBLE DESIGN

- American Disabilities Act of 1990 - ADA
- 2010 ADA Standards for Accessible Design
  - "2010 Standards" or "Standards"
  - ADAAA – ADA Amendments Act
  - Combines Title II and III into one Standard.
  - Includes new, and/or altered government facilities, public accommodations and commercial facilities.
  - Adopts 2004 ADAAG – added “...communicating,...”
- Section 219.2 & 706 - Communication Elements and Features – (ALS)


2010 ADA STANDARDS

- Sections 219 and 706 - Communication Elements and Features – (ALS)
- Scoping requirements:
  - What?
  - Where?
  - How Many?
- Minimum requirements!
- There are exceptions!!!

DOJ - Department of Justice
• CFR - Code of Federal Regulations
ABA - Architectural Barriers Act, 1968, Federally funded
ADA - American Disability Act, 1990 and 2010 ADA
ADAAG - 2004 ADA Accessibility Guidelines for Buildings and Facilities
ADA - Access Board - Independent Federal Agency enforces ADA.
• Devoted to accessibility - has expanded to be a leading source on accessible design criteria, technical assistance, telecommunications, electronic and information technology.

IBC - ANSI

**What:**

SECTION 706 Assistive Listening System (ALS)

• "Assistive Listening Device. A permanent system that reinforces sound transmission within an area from a source to a receiver/transducer to be used by the hearing impaired within that area. (acoustical space)


Appendix – ALS Performance Standard
• Hearing Loop System
• Infrared System
• FM System

LOUDER IS NOT BETTER!

**2010 ADA STANDARDS**

**What:** ALS OPTIONS

- **Hearing Loop / Induction Loop (T-Coil):**
  - Least discriminatory
  - Privacy by design – Serves every one equally
  - User enabled – User friendly technology
  - May experience 60 Hz interference degradation but is usually correctable.

- **Infrared:**
  - User wears battery operated receiver with loop transmitter to T-Coil.
  - Line of sight, very good privacy, sunlight degradation.
  - Equipment, system, and batteries to maintain – Users limited to number of devices

- **FM:**
  - User wears battery operated receiver with loop transmitter to T-Coil.
  - Equipment, system, and batteries to maintain – Users limited to number of devices
  - Large systems expensive.

- **Captioning:**
  - Requires media format, typically internet connection, everyone benefits.
  - Open or Closed captioning.

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**Where:**

- Section 706 – Special Occupancies
- Section 219 - Assistive Listening Systems.

"...where audible communications is integral to use of the space...space shall have ALS,...comply with Appendix L. ALS Performance Standards"

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How Many:

<table>
<thead>
<tr>
<th>Capacity of Seating in Assembly Area</th>
<th>Minimum Number of Required Receivers</th>
<th>Minimum Number of Receivers Required to be Hearing Aid Compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 or less</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>61 to 200</td>
<td>2, plus 1 per 50 seats over 200</td>
<td>2</td>
</tr>
<tr>
<td>201 to 500</td>
<td>2, plus 1 per 75 seats over 200</td>
<td>1 per 4 receivers</td>
</tr>
<tr>
<td>501 to 1000</td>
<td>20, plus 1 per 33 seats over 100</td>
<td>1 per 4 receivers</td>
</tr>
<tr>
<td>1001 to 2000</td>
<td>35, plus 1 per 50 seats over 1000</td>
<td>1 per 4 receivers</td>
</tr>
<tr>
<td>2001 and over</td>
<td>55 plus 1 per 100 seats over 1500</td>
<td>1 per 4 receivers</td>
</tr>
</tbody>
</table>

Exceptions:
- ALS is not required if audio amplification is not provided, except for courtrooms.
- Number of HA Compatible Receivers: Where all seats in an assembly area are served by an induction hearing loop, the minimum number of hearing aid compatible receivers does not apply.
- ADA Safe Harbor
  - Does not preclude a consumer from requesting the facility provide effective communication
  - Except places of worship and private clubs, unless...
- Building with more than one assembly area: Calculation may be based on totals, provided all receivers are usable with all systems, and under one management.

Sound Level Comparisons:

- Library Whisper: 30 dB
- City Traffic: 70 dB
- Lance Moore: 107 dB
- Loud Rock Concert: 130 dB
- Threshold of pain: 140 dB
- Jet Engine @ 30 ft: 200 dB

2010 ADA STANDARDS

**IBC-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.

- **706.5 Signal-to-Noise Ratio (SNR).**
  - 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.


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2010 ADA STANDARDS

**IBC-ANSI:**

- **Signs**
  - Identification of communications
  - 216.10 – Assistive Listening Systems
    - Information of availability.
    - At each assembly area.
    - Conventional form,
      - Script, Decorative, Italic Forms are prohibitive.


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**Loops Can Be Installed Anywhere**

Amtrak, Penn Station, NYC

Grand Rapids Airport, MI

Indian Trails Bus Co.
Loops Can Be Installed Anywhere
(Graceland – Memphis TN)

- Parking Attendant
- The porch at Graceland
- A bed on Elvis’ plane

Loops Can Be Installed Anywhere

- New York City Taxi
- Office Reception Desk
- House of Worship
- Michigan State Stadium

Loops Can Be Installed Anywhere
(Dividable rooms at Meijer Garden, Grand Rapids MI)

- Conference room
- Office area
- Adhesive covering
- Private drop zone
Loops Can Be Installed Anywhere
(Grand Rapids Airport Arrivals Waiting Area)

Arrows point to a scored groove in the floor.

Good Hearing Loops

Uniform signal across the listening field

Even frequency response

International Standard
(IEC 60118-4)

Acceptable level of electromagnetic interference

Good Hearing Loops: Uniform Signal Strength
Perimeter Loop out of Spec
(Due to metal effects in building or too wide of a loop)

Metal & overspill can be controlled with a properly engineered phased array of loops

Overspill can be controlled
...a perimeter system...
... and a phased array
Good Hearing Loops: Possible Sources of EMI

<table>
<thead>
<tr>
<th>Source</th>
<th>Status</th>
<th>Potential Issue</th>
<th>Source removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florescent lighting</td>
<td>New FCC rules</td>
<td>If very old lighting</td>
<td>YES</td>
</tr>
<tr>
<td>Tube TV/monitors</td>
<td>No new production</td>
<td>Only if still using an old tube monitor</td>
<td>YES</td>
</tr>
<tr>
<td>Dimmers</td>
<td>Dramatic</td>
<td>Improvements</td>
<td>YES</td>
</tr>
<tr>
<td>Electrical wiring issues</td>
<td>Ground loops</td>
<td>Yes but can and should be detected and repaired</td>
<td>It can be</td>
</tr>
<tr>
<td>Distortion on Power lines</td>
<td>IEEE 519 is in place</td>
<td>Can be and one should try to work it through with the power company</td>
<td>Not a common issue</td>
</tr>
</tbody>
</table>

Summary of Good Hearing Loops

International Standard (IEC 60118-4)

- Even frequency response that varies no more than +/- 3dB
- Uniform signal across the listening field that varies no more than +/- 3dB
- Less than -32 dB of electromagnetic interference within the loop

Good Hearing Loops Are Not Affected by Head Tilt

0dB = full level
-3dB (80°)
-3dB (140°)
Full level
Phased Array Hearing Loop
If head tilt is an issue: A Phased Array Loop is a Must

Outdoor Theatre at the Getty Villa, California

Benefits of hearing loops at the moment

- **Simple**: For people of all ages to operate - (No need to pair and charge special equipment)
- **Dignified and easy to access**: No need to locate, check out, and wear special equipment
- **Affordable**: Loops don’t add to the cost of already-expensive devices
- **Available**: Telecoils are offered in nearly all but smallest of instruments and now also in remotes

Benefits of hearing loops at the moment

- **Flexible**: The hearing instrument mic can be simultaneously off or on (as with the T and the M+T settings programmed for the user)
- **Energy efficient**: Telecoils do not decrease battery life
- **Scalable**: Loops can be applied in public spaces both small and vast including transient situations (counters)
- **Universal**: The same signal serves everyone, no matter their location or hearing instrument manufacturer.
  - Double the usefulness of hearing aids
  - Exceed hearing instrument user expectations
**Why not Bluetooth?**

- HA MFRs have yet to develop a universal standard
- Experts predict this will take 10+ years (if ever)
- Major issues as the moment:
  a) Time delays
  b) Quality of Sound – reduced frequency response
  c) Power consumption
  d) Takes up valuable space inside hearing aids

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**Interesting development?**

1. Smart phones or earphones equipped with Telecoils
2. Apps that correct for the person’s hearing loss
   1 and 2 combined would make the perfect loop listener for persons with (beginning) hearing loss and will decrease need for # of ALS devices
3. A recent study at NIU showed that normal hearing students would use a loop if it were available

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**Hearing Loops: Installed Across the US**
Fun Fact: Hearing Assistance Technology Signage

Hearing Loop Truths and Myths

- Hearing assist is the law. \[\quad\text{Truth}\]
- Bluetooth is the way to go. \[\quad\text{Myth}\]
- Hearing loops are expensive. \[\quad\text{Myth}\]
- Spillover can not be controlled. \[\quad\text{Truth}\]
- You can install a loop anywhere. \[\quad\text{Myth}\]
- Just run a loop wire around the room. \[\quad\text{Myth}\]
- Hearing loops perform better than any other HAT. \[\quad\text{Myth}\]
- Good hearing loop installers can’t be found. \[\quad\text{Myth}\]

Vetting Hearing Loop installers

- Is the installer trained in IEC60118-4 standard?
- Does the installer offer a website which lists installations (aka references)?
- Site visits are not optional
- Who will integrate the PA system with the loop if two different vendors are used?
- Signage offered? Who trains the staff?
- Will a certificate of IEC conformity be issued?
- Commissioning of the loop (recommended)
Resources

Loop Advocacy sites: www.hearingloop.org & www.LoopWisconsin.com

Hearing loop vendors by state: www.hearingloop.org/vendors.htm

Hearing Loop installations nationwide: www.aldlocator.com

Unique loop installation technique photos: www.drssound.com

Find trained installers in your area contact:
www.contactaglobal.com & www.listenaudio.com

For a Generic US Hearing Loop Specification
(aka Audio Frequency Induction Loop or AFILS)

Special thanks to
Karen MacLennan, AuD & Cynthia Compton-Conley PhD
Richard McKinley, Cory Schaefer and Conny Anderson and others

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Questions?

You may type and submit questions in the Chat Area Text Box or press Control-M and enter text in the Chat Area
Thank you for participating in today’s ADA-Audio Conference Session

The next scheduled session is:

“Accessible Construction Management”

September 16, 2014

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