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Customize Your View continued

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  2. **By Email** webinars@ada-audio.org; or

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Helping People with Hearing Loss
Hear in Public Places
Through the use of
Hearing Loop Technology

ADA Webinar
August 26, 2014
Juliette Sterkens & Don Bataille

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
Presenter

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.

IMPARED 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

- **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)**
  
  (Demo courtesy Linda Thibodaux, PhD)
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.

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

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

Hearing Loops:
Greatly improve functionality of hearing aids.
Hearing Instrument Users’ Perspective on Loops

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

Are we missing an incredible opportunity to help our patients hear—and to grow our industry?

It has been my experience that hearing loops offer patients significantly improved hearing & understanding.

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.
Audiologists’ Perspective on Loops

Get your patients “in the loop”

By William Diles

People with hearing loss often struggle to catch subtle, fast-paced dialogues, even if they wear well-fitted, advanced digital hearing aids. A patient of mine—let’s call him John Smith—has been fitted with the best hearing aids available. On a follow-up visit, John said he is a hearing loss sufferer, doing much better in noisy environments, and enjoying life more again. But, he said, he still relies on captions when watching television.

As audiologists, we know that hearing aids can greatly benefit our patients. But, there are other factors that contribute to the satisfaction level of our patients. In this article, I will discuss three reasons why hearing aids may be more satisfying than captioning.

1. Patient satisfaction
   - Patients are more satisfied with their hearing aids.
   - Patients are more satisfied with their hearing aids than with captioning.
   - Patients are more satisfied with their hearing aids than with captioning.

2. Improved quality of life
   - Hearing aids help patients hear better in noisy environments.
   - Hearing aids help patients hear better in noisy environments.
   - Hearing aids help patients hear better in noisy environments.

3. Increased referrals
   - Hearing aids help patients hear better in noisy environments.
   - Hearing aids help patients hear better in noisy environments.
   - Hearing aids help patients hear better in noisy environments.

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 → T-coil in Hearing Device
Hearing Loops Improve SNR Wirelessly

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

AC-powered IR Transmitter

Receivers must always be used

1. Acoustic Coupling  2. Inductive Coupling  3. DAI
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"

- 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
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 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 or 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?  n=208

![Bar chart](image)

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 hearing devices</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!!!

2010 ADA STANDARDS

- 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 ABA.
  - Devoted to accessibility - has expanded to be a leading source on accessible design criteria, technical assistance, telecommunications, electronic and information technology.
- IBC - ANSI


---

2010 ADA STANDARDS

**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)

2010 ADA STANDARDS

**What:**

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

LOUDER IS NOT BETTER!


---

2010 ADA STANDARDS

**What: ALS OPTIONS**

- Hearing Loop
- FM System
- Infrared System
- Neck Loop (706.3)

- Active Environment
- Passive Environment
2010 ADA STANDARDS

**What:**
- **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.
- **Infra-red**
  - 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.


2010 ADA STANDARDS

**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”

2010 ADA STANDARDS

How Many:

<table>
<thead>
<tr>
<th>Capacity of Seating in Assembly Area</th>
<th>Minimum Number of Required Receivers</th>
<th>Minimum Number of Required Receivers Required to be Hearing-aid Compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 or less</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>51 to 200</td>
<td>2, plus 1 per 25 seats over 50 seats</td>
<td>2</td>
</tr>
<tr>
<td>201 to 500</td>
<td>2, plus 1 per 25 seats over 50 seats</td>
<td>1 per 4 receivers</td>
</tr>
<tr>
<td>501 to 1000</td>
<td>20, plus 1 per 33 seats over 500 seats</td>
<td>1 per 4 receivers</td>
</tr>
<tr>
<td>1001 to 2000</td>
<td>35, plus 1 per 50 seats over 1000 seats</td>
<td>1 per 4 receivers</td>
</tr>
<tr>
<td>2001 and over</td>
<td>55 plus 1 per 100 seats over 2000 seats</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 HA 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 total seats, provided all receivers are usable with all systems, and under one management.

2010 ADA STANDARDS

Sound Level Comparisons

<table>
<thead>
<tr>
<th>Library Whisper</th>
<th>City Traffic</th>
<th>Lawn Mower</th>
<th>Loud Rock Concert</th>
<th>Threshold of pain</th>
<th>Jet Engine @ 30ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>30dB</td>
<td>90dB</td>
<td>107dB</td>
<td>120dB</td>
<td>130dB</td>
<td>140dB</td>
</tr>
</tbody>
</table>


---

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.

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.


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)

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

Acceptable level of electromagnetic interference

International Standard (IEC 60118-4)

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

A phased array system
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 improvements</td>
<td>Could still be wired improperly</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

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

International Standard (IEC 60118-4)

Good Hearing Loops Are Not Affected by Head Tilt

Phased Array Hearing Loop

0dB = full level

-3dB (@45°)

-3dB (@45°)

full level
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
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

Hearing Loops: Installed Across the US

[Map showing hearing loops installed across the US]
Fun Fact: Hearing Assistance Technology Signage

Hearing Loop
Switch hearing aid to T-call

Hearing Loop Truths and Myths

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

ADA Audio Conference Series
August 26, 2014
Vetting Hearing Loop installers

- Is the installer trained in IEC 60118-4 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](http://www.hearingloop.org) & [www.LoopWisconsin.com](http://www.LoopWisconsin.com)

Hearing loop vendors by state: [www.hearingloop.org/vendors.htm](http://www.hearingloop.org/vendors.htm)

Hearing Loop installations nationwide: [www.aldlocator.com](http://www.aldlocator.com)

Unique loop installation technique photos: [www.drssound.com](http://www.drssound.com)

Find trained installers in your area contact: [www.contactaglobal.com](http://www.contactaglobal.com) & [www.listentech.com](http://www.listentech.com)


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