AES 59th Conference Sound Reinforcement Engineering and Technology

Hearing Loops and Assistive Listening Technology



About Ampetronic

- World's leading developer of hearing loop systems
- Over 25 years of innovation within the ALD/ALS market
- Worldwide distribution & training network
- Contributors to international performance standards
- Committed to education & promotion of good practice
- Our core principle: Provide a genuine benefit



What does hearing loss look like to an audio engineer?



Sounds & Hearing Loss - A Brief Explanation



Why aren't hearing aids the complete solution?



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Limitations of Hearing Aids

- Limited by microphone technology
- Limited by distance to desired sound source
- Pick up unwanted ambient and reverberated sound despite DSP optimisations
- Effective hearing aid range:
 6 feet (Matthew Bakke PhD)



Signal-to-noise ratio vs intelligibility



Matthew Bakke determined users with significant hearing loss typically need +18dB SNR



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Limitations of Hearing Aids



Hearing Loops How does assistive listening help?



The Assistive Listening System Principle



The Assistive Listening System Principle



The Assistive Listening System Principle



Improvement in listening experience with hearing loops



Improvement in listening experience with hearing loops



What are Hearing Loops and how do they work?



Induction / Hearing Loop System Basics



Hearing Loop Principles – Sources



Hearing Loop Principles – Loop Amplifier / Driver



Hearing Loop Principles – Magnetic Field

Hearing aid Telecoil will pick up the vertical component





Magnetic Field Pattern - Area Coverage Systems



Magnetic Field Pattern - Area Coverage Systems



Magnetic Field Pattern – Local Coverage Systems

Hearing Loops Where can they be used?



Applications – Houses of Worship



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Applications – Theatres & Cinemas





Applications – Classrooms & Lecture Theatres





Applications – Concerts & Live Music Events



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Unique Applications – Transient Use

- Anywhere that the user is temporary or 'transient'
- Hearing loops can be used where

other systems can't, e.g.

- a) Reception desks
- b) Service counters
- c) Intercoms

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Unique Applications - Transport

 Hearing loops are the only system suitable where receivers

cannot be handed out







Unique Applications – Intercoms & Help Points



Unusual Applications – Airports

Unusual Applications – Lifts

Unusual Applications – 2010 UK Papal Visit

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Applications – More to do!

It's old tech – So why are Hearing Loops so topical and important?

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Hearing Loops vs competing technologies

- Competing assistive listening technologies (IR and FM) easier to install, but require receivers
- Induction loops are direct-to-hearing aid
 - Discreet and convenient for users
 - Low-overhead for facility providers
- "It's a dignified solution", Richard Einhorn, Composer and hearing aid user

The use of hearing loops is expanding

- Over the last 10 years the United States has woken up to hearing loops – driving demand with HI manufacturers
- Increasingly popular across Europe
- Legislation is tightening up across the World
- Activity by both hearing aid user and advocacy groups
- The quality of hearing loops has improved immeasurably
- No other technology can provide the same service

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The Law & Compliance

- USA Americans with Disabilities Act
- UK Equality Act 2010
- Australia Disability Discrimination Act

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International Loop Performance Standard

BS EN IEC 60118-4:2006 BRITISH STANDARD 60118-4:2006 Electroacoustics -Specifies performance criteria, Hearing aids — Part 4: Induction loop systems for hearing aid purposes — Magnetic field strength including: a) Low magnetic noise Adequate field strength, and uniformity b) of field strength across coverage area The European Standard EN 60118-4:2006 has the status of a British Standard Linear (and consistent) frequency **c**) 105 12 140 50 response 55 N EXCEPT AS PER

International Loop Performance Standard

What are the potential performance issues?

Effects of Aspect Ratio on Area Coverage

- Area coverage is listed on many amplifier datasheets
- Specifications can be misleading

Loop Impedance – The need for current-drive

Metal loss

- Induction of fields into metal structures causes signal losses
- Field Strength and frequency response can both be affected
- Effects often vary across a space

Metal loss – Effect in small room

Metal loss – Effect in large room

Perimeter Loop In Suspended Ceiling 10m x 10m

Loss Control MultiLoop™

Metal Loss – Effect on perimeter loop

Metal Loss – Effect on Loss Control MultiLoop™

Overspill

Overspill

- Perimeter loops spill significantly outside the room
- Low-spill designs can substantially reduce spill

Perimeter loop spill			Low-spill	array spill
To either side of a loop	-40dB at 1-2 x loop width		To either side of a loop	-40dB at 1.5m from loop edge (typical)
Above or below a loop	-40 dB at 2-3 x loop width	/ /	Above or below a loop	-32 dB at 4.0m (typical)

Low Spill MultiLoop™

Hearing Loops How do I test and measure systems?

Field Strength Meter (FSM)

- 3 different measurement modes:
 - a) Background noise
 - b) Signal strength
 - c) Frequency response
- Used for site testing in the absence
 - of audio analyser

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CMR3 Features & Applications

- Calibrated audio induction loop receiver
- Compatible with audio analysers
- Accuracy within 0.5dB
- Enables magnetic field plotting
- OdBu output @ 400mA/m RMS
- 3.5mm Stereo Jack connector

CMR3 & NTI Minilyzer Combination

Details at www.nti-audio.com

Ampetronic Loopworks Measure – Demo!

Resources

- Ampetronic <u>www.ampetronic.com</u>
- Let's Loop America <u>www.hearingloop.org</u>
- "A hearing aid that cuts out all the clatter", NY Times –

www.nytimes.com/2011/10/24/science/24loops.html

Get in the Hearing Loop, HLAA – <u>www.hearingloss.org</u>

Thank you for your attention Any Questions Please?

