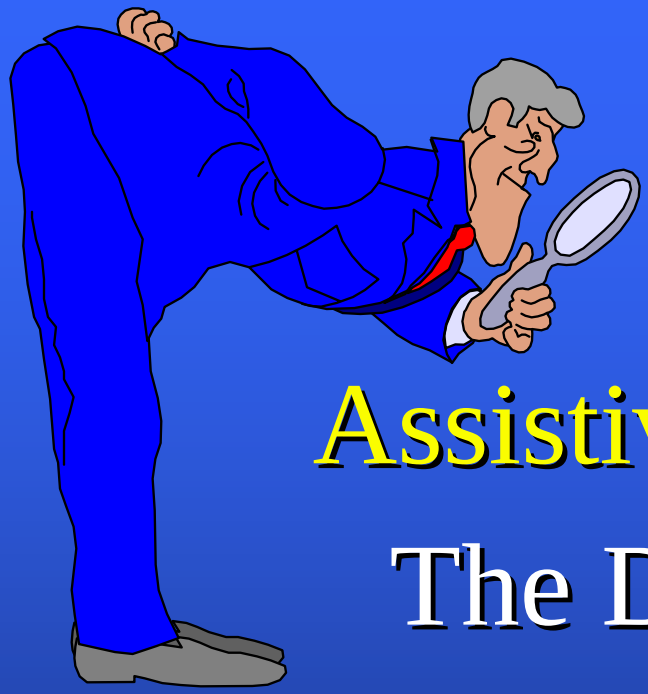


Demystifying Assistive Listening Devices:

The Devil is in the Detail

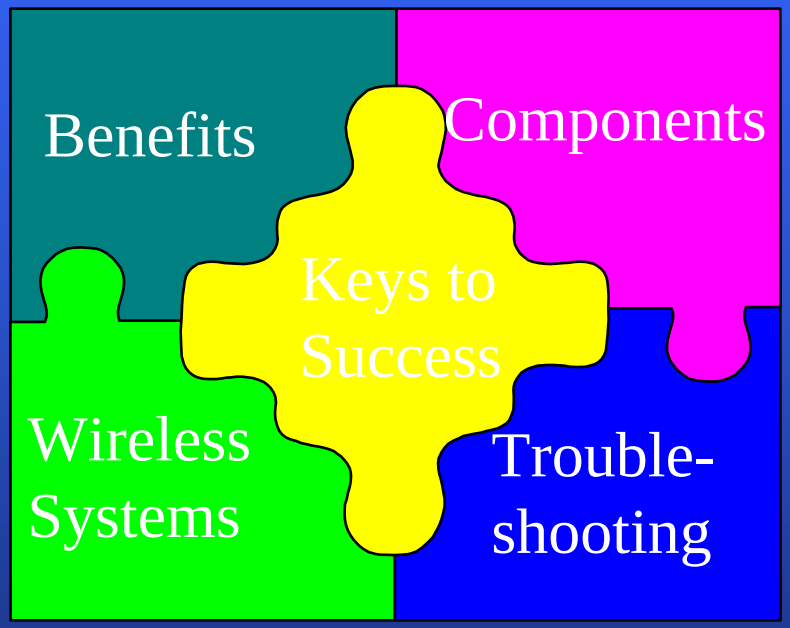
Cheryl D. Davis, Ph.D.
WROCC Outreach Site at
Western Oregon University
http://www.wou.edu/nwoc/demyst.htm

PEPNet Regional Centers

http://www.pepnet.org

Agenda

- Benefits
- Components
- Wireless systems
- Troubleshooting
- Keys to success

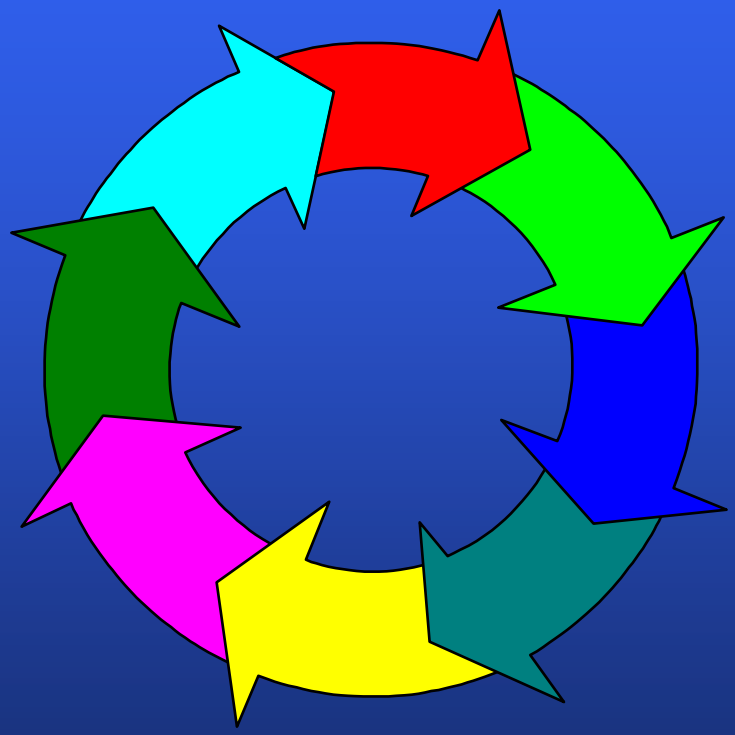


Why use assistive listening devices?

- Why aren't hearing aids enough?
- What do hearing aids do?
  - sounds > sounds
- What do ALDs do?
  - sounds > sounds
- ADA mandates *effective* communication

Components

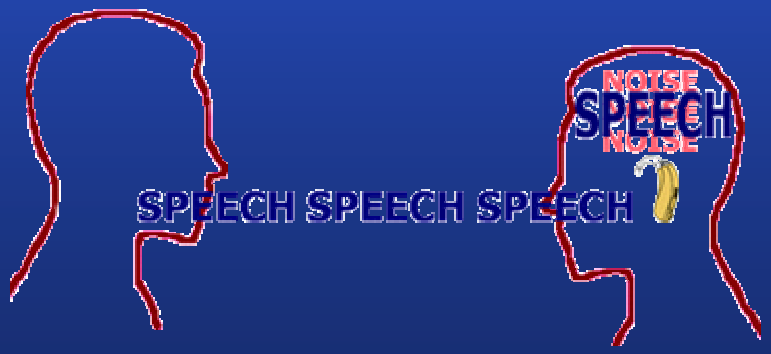
- Individual
- Sound
- Environment
- Sound Source
- Microphones
- Transmitter and Receiver Systems
- Coupling Devices
- Telecoils



Components: Individual

- Hearing loss
  - binaural or monaural
  - severity (dB) and frequency (Hz)
  - conductive or sensorineural
  - may fluctuate or be progressive
- Age at onset of loss
- Acceptance of loss
- Speech reading ability
- Hearing aid/T-coil use
- Knowledge of and comfort with ALDs

Components: Sound



- Dimensions
  - Frequency
  - Loudness
- Impact on Speech Intelligibility
  - Distance
  - Signal-to-Noise Ratio
  - Reverberation

Speech Sounds: Frequency & Loudness

Normal
#6

Mild
21-40 dB
#10

Moderate
41-60 dB
#9

Severe
61-80 dB
#8

Profound
81 or more
#7

0	125	250	500	750	1K	1.5K	2K	3K	4K	6K	8K
10										f	th
20		Zv								S	
30	j	mdb	Ia		Ph	G		K			
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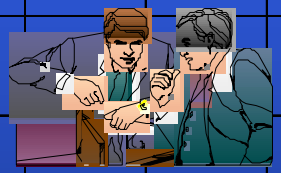
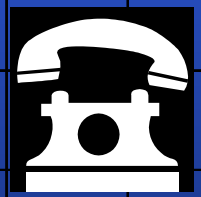
50		u									
60											
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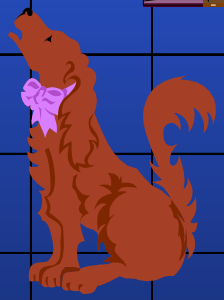
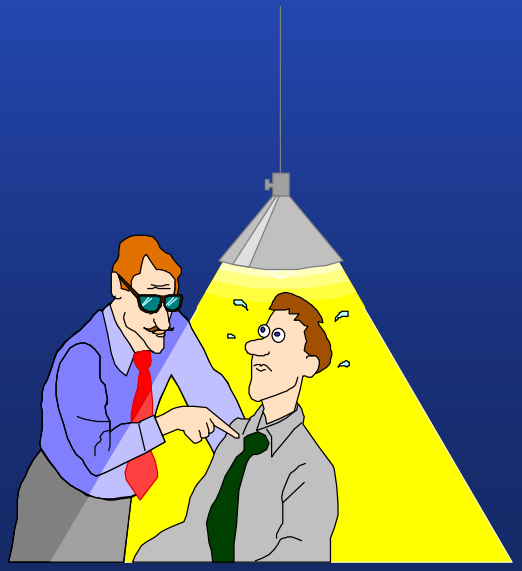


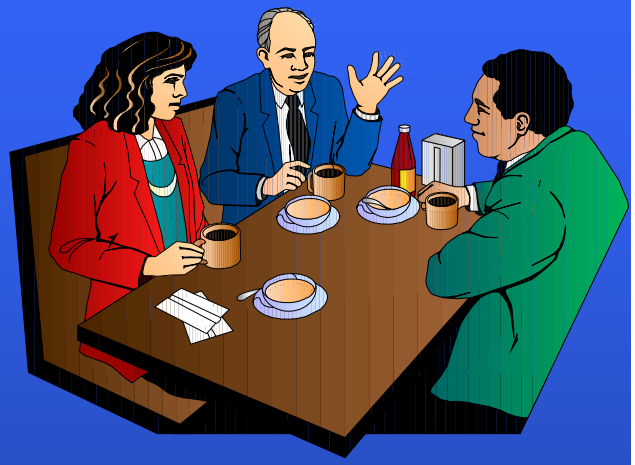
Components: Environment

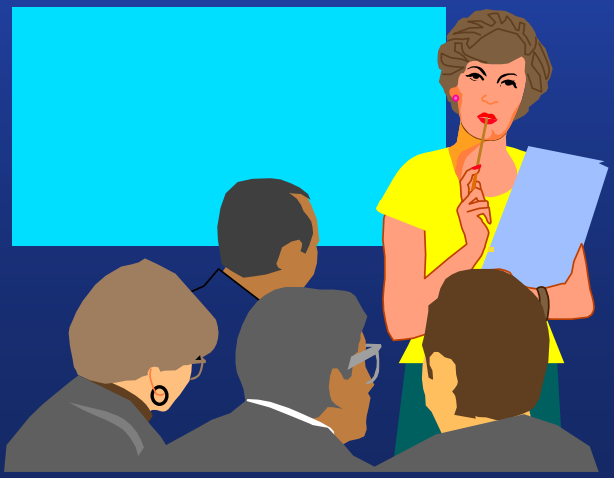
- Light or dark
- Uncovered windows
- Distance from speaker
- Room acoustics and noise



Components: Sound Source

- Instructor giving a lecture
- Panel of speakers
- Video or audio recording
- Q&A from the audience
- Hard of hearing student
- Neighboring student





Communication Tips

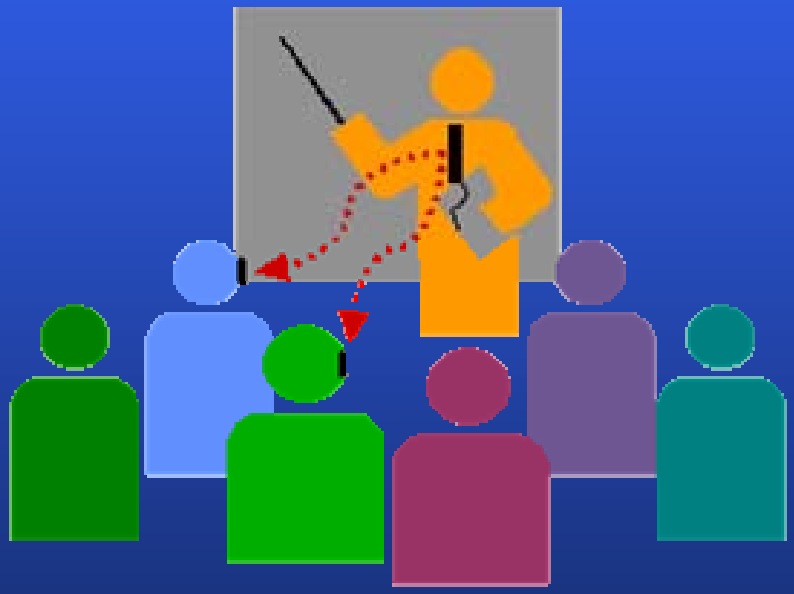
- Face-to-face communication
- Maximal lighting conditions
- Don’t yell
- Be patient
- Don’t be afraid to write

Components: Microphones

- Omnidirectional
- Unidirectional
- Lavaliere or Lapel
- Table top or conference
- Environmental mic
- Placement is vital!
  - Remember effect of distance on sound

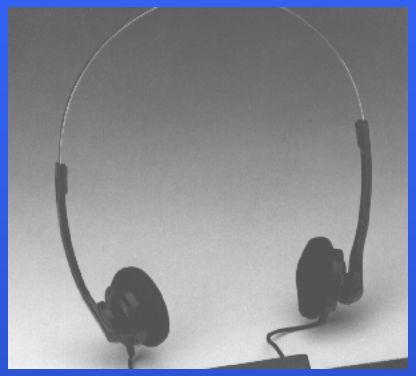
Components: Transmitter and Receiver Systems

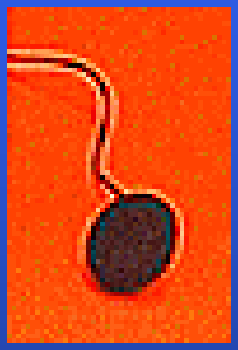
- FM
- Infrared
- Electromagnetic induction loop
- Hardwired systems



Components: Coupling Devices

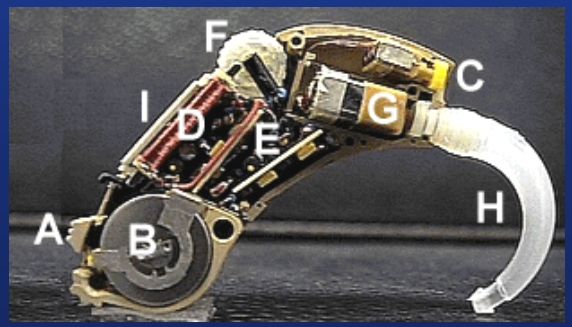
- No hearing aid OR no T-coil
  - headphones
  - earbuds
- Hearing aid with T-coil
  - neckloop
  - silhouette
  - headphones
- Other methods
  - Direct Audio Input
  - FM Boot
  - Cochlear implants





Components: Telecoils

- Hearing Aids: Microphone vs T-coil
- Not all hearing aids have T-coils
- T-coils are not as sensitive as hearing aids
- Proximity is important
- Commonly found in telephones and speakers
- Susceptible to electromagnetic interference

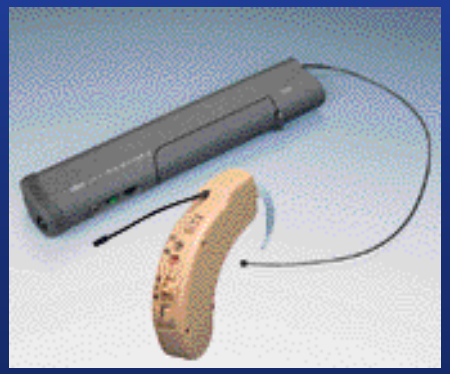


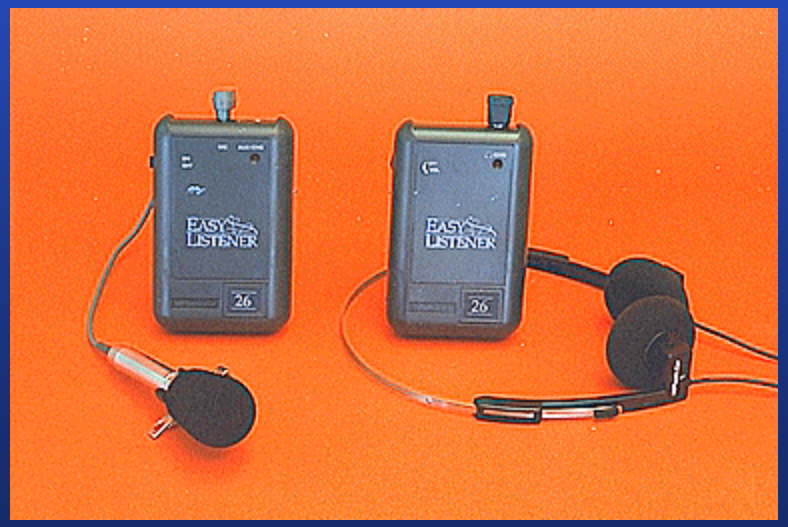
T-coils & Couplers & Mics! Oh My!

- Encourage T-coil purchase and usage.
- Inform students about the possibility of a Mic/T/Both switch.
- Make environmental mics available.
- Experiment with different coupling devices.

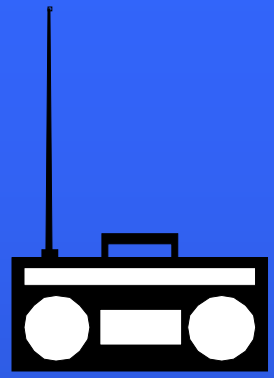
FM

- Uses radio waves
- Transmitter
  - a radio station
- Receiver
  - a radio
- Crib Monitor





True or False?



- You can leave the room and still hear the presentation.
- This system can be used indoors or outdoors.
- You must have a receiver to use this system.
- You must have a hearing aid to use this system.
- You can use FM in multiple rooms in a building.
- I can use my FM receiver with your FM transmitter.

FM Advantages

- Very portable
- Very easy to set up and use
- Offers great flexibility of movement
- Used indoors or outdoors
- Appropriate for mild to profound losses
- Receiver can be covered or put in pocket
- No fluctuation in strength of signal

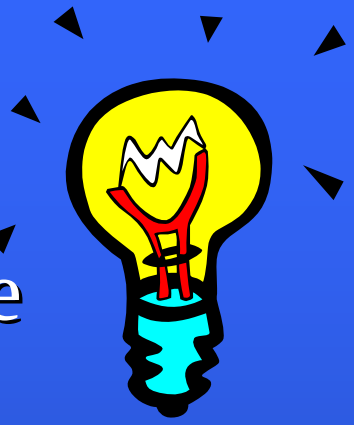
FM Disadvantages

- Receivers are required for everyone
- Receivers vary in quality and durability
- Potential for outside interference
  - 72-76 MHz bandwidth allotted by FCC
  - police band, construction walkie talkies, pagers
- Receivers and transmitters must be on the same channel
- There must be 1 free channel between systems used in close proximity

Infrared

- Uses infrared light
- Transmitter-emitter panel
  - like the infrared diode on a remote control
  - emits signal in 60 degree cone-like a flashlight
- Receiver
  - like the infrared receiver area on a TV or VCR
- TV headphones

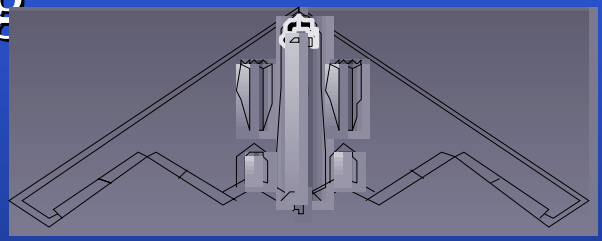
True or False?



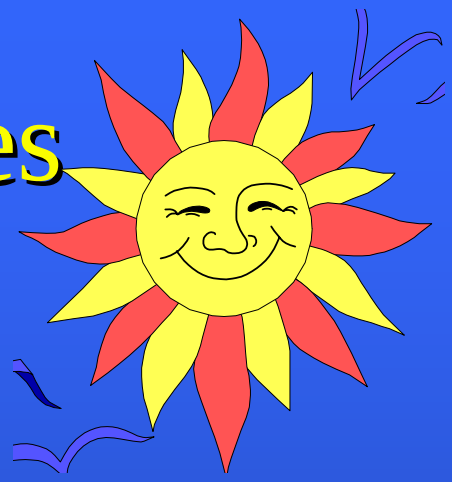
- You can leave the room and still hear the presentation.
- This system can be used indoors or outdoors.
- You must have a receiver to use this system.
- You must have a hearing aid to use this system.
- You can use infrared in multiple rooms in a building.
- I can use my IR receiver with your IR transmitter.

Infrared Advantages

- Compatibility: 95 kKz is industry standard
  - Home receivers can be used with public transmitters
  - 250 kHz if high intensity lighting
- No spillover means security
- Can be used in adjacent rooms
- Widest bandwidth and best sound reproduction
- Appropriate for mild to moderate/severe loss
- Not affected by radio transmission

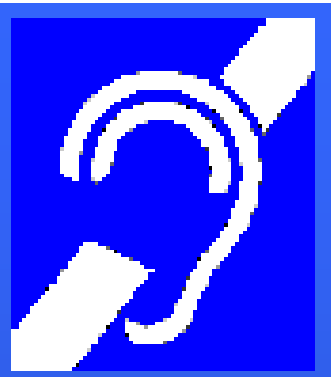


Infrared Disadvantages

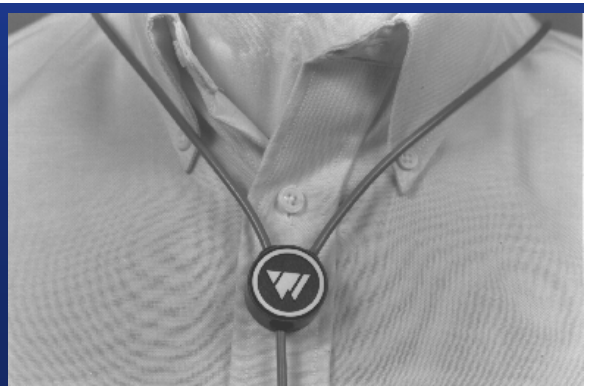


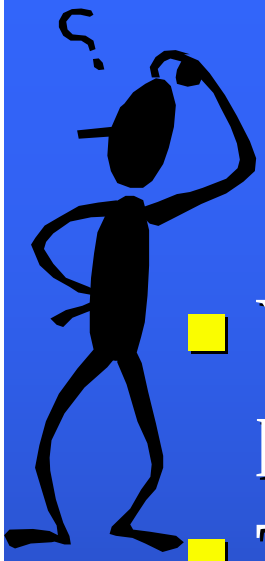
- Receivers required for everyone
- Must have direct line of sight
- Can’t cover the receiver or put in pocket
- Indoor or evening use only
- High intensity or fluorescent lights cause interference
- Large areas require multiple emitter panels
- Quality varies with company

Electromagnetic Induction Loop



- Uses electromagnetic fields of energy
  - Power lines
- Transmitter-Loop of several wires
- Receiver
  - T-coil in hearing aid
  - desktop receiver
- Telephone and other speakers
- As small as a neck loop or as large as an auditorium



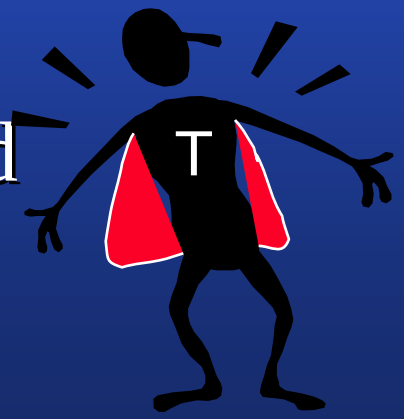


True or False?

- You can leave the room and still hear the presentation.
- This system can be used indoors or outdoors.
- You must have a receiver to use this system.
- You must have a hearing aid to use this system.
- You can use induction loops in multiple rooms in a building.
- I can use my loop receiver with your loop transmitter.

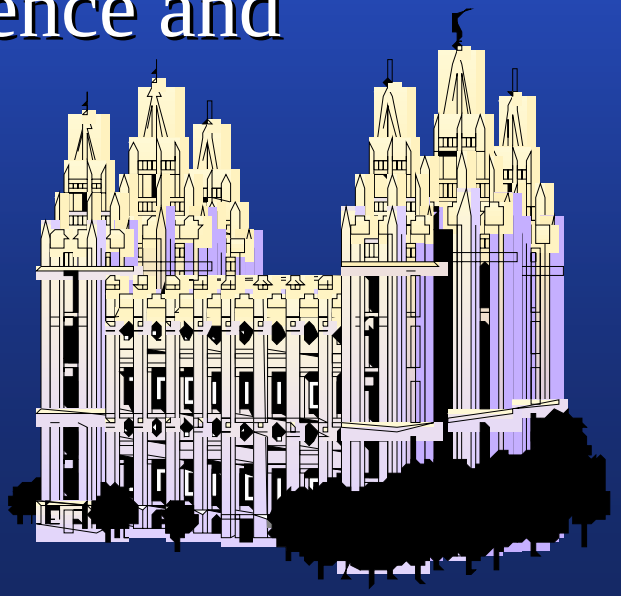
Induction Loop Advantages

- Low equipment costs after installation
- Easy operation
- Lasts forever
- Induction receivers are compatible with ALL loop systems
- Unobtrusive with T-coil hearing aid



Induction Loop Disadvantages

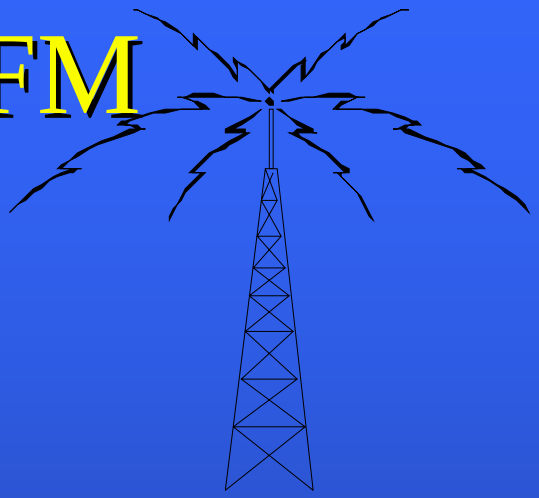
- Installation costs may be high
- Installation may not be possible in historic buildings
- Can’t assume everyone will have a T-coil
- Susceptible to electrical interference and spill over
- Must sit around looped area
- May be dead areas within loop



Troubleshooting: General

- Batteries charged?
- Deductive reasoning
  - T-coil working? try it out with a phone call
  - try different couplers
- Ultrasonic sensors
- Check with local SHHH group
- Cultivate an expert
- Call the company!

Troubleshooting: FM



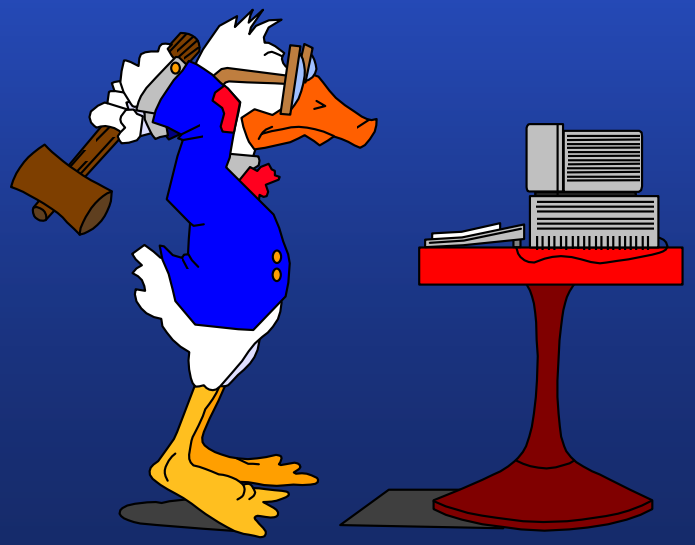
- Are the receiver & transmitter on the same station (frequency)?
  - Color code or number them
- What sources of interference are close by?
  - Station drift-your system OR someone else's
  - police band, construction walkie talkies, pagers
- Must have one free channel difference if 2 different stations are being used in rooms next to each other.

Troubleshooting: Infrared

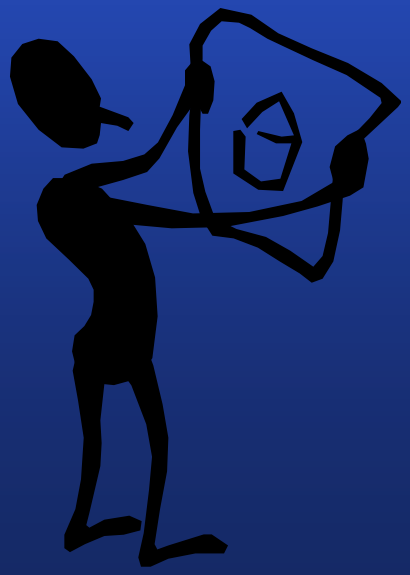
- Is the room bright, or is direct sunlight present?
- Is anything blocking the line of sight?
- Are high intensity fluorescent lights present?

Troubleshooting: Induction Loop

- Are there sources of electrical interference and spillover nearby?
- Portable systems can be a mobility hazard. Are wires protected?



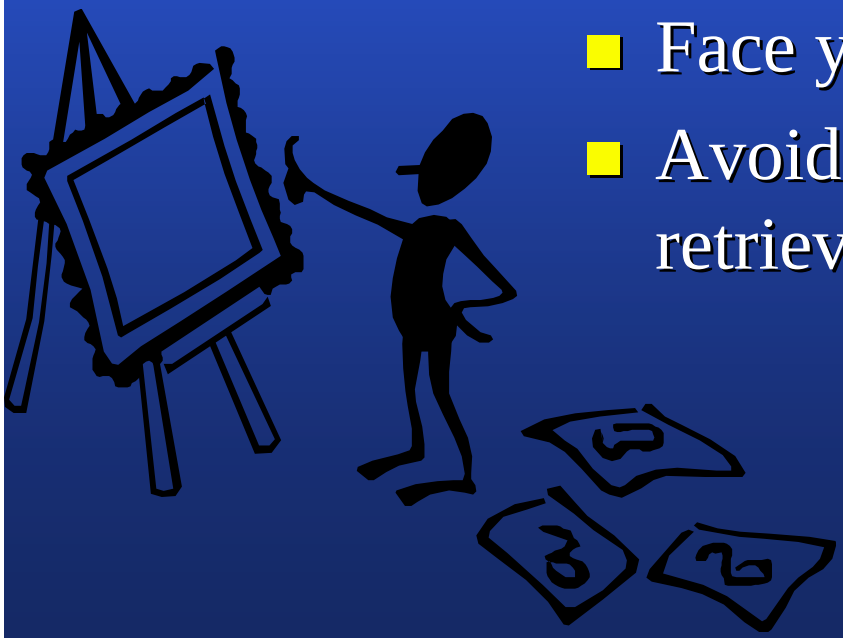
Keys to Success for the Speaker



- Avoid drawing attention to the individual user
- Repeat questions from the audience
- Place mic close to mouth (or other sound source)but NOT in front of the mouth
- Use an unidirectional mic when possible
- Turn off or step away from overhead when not in use
- Do not direct their attention away from your face, and then start talking!

Keys to Success for the Speaker

- Repeat questions from the audience
- Rephrase instead of repeat
- Don’t stand in front of windows or bright lights
- Face your audience when speaking
- Avoid talking while the class is retrieving materials



Keys to Success for the Student

- Batteries charged and T-coil working
- Proximity to T-coil
- Proximity to interference
  - just changing seats may help
- Continue to sit within 20 ft. of the speaker if you will use speech reading
- Interact with others about coping techniques-SHHH, Beyond-Hearing

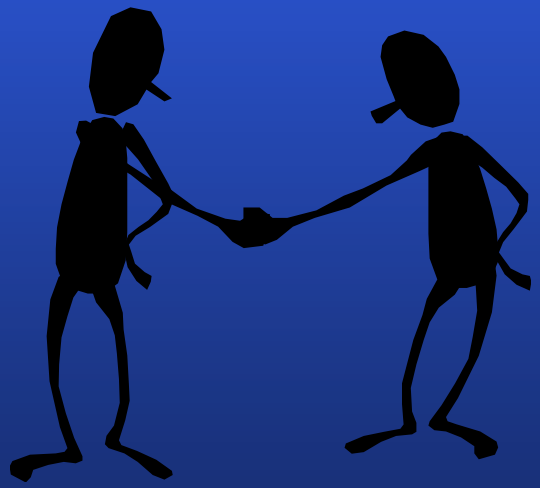
Keys to Success for the Student

- Make sure the volume is down when you first put the coupler on
- Experiment with different couplers, locations, and environments
- Get an environmental mic or hearing aid with mic/t/both position
- Check out equipment ahead of time
- While you are at it,

  check out the instructors too!
- Be specific

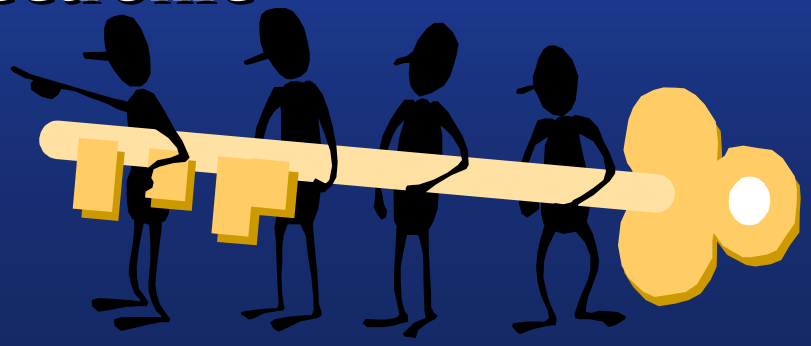
Keys to Success for the Service Provider

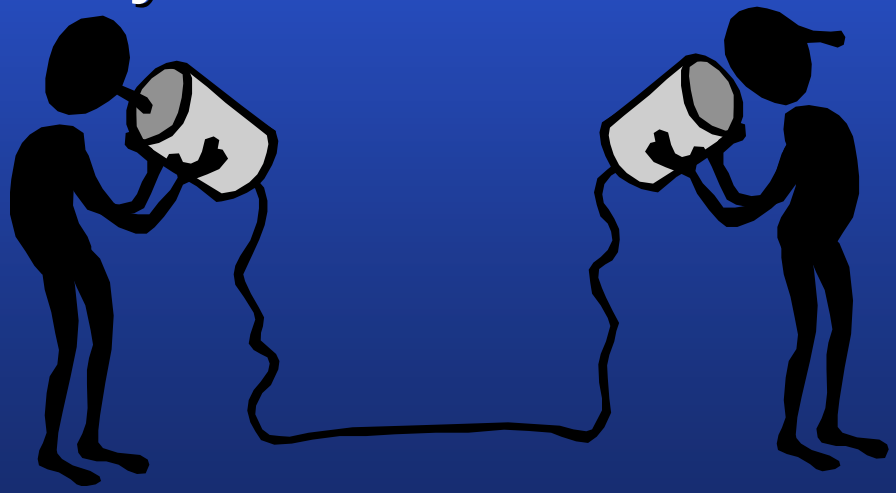
- Cultivate an expert for troubleshooting
- Always check out the system ahead of time
- Experiment
- Encourage users to experiment
- Show how ALDs can be unobtrusive
- Advertise that the systems are available
- If the user isn't ready yet
  - SHHH or ALDA meetings or web sites
  - e-mail lists like Beyond-Hearing
  - provide a fact sheet on the devices available from your program
  - provide info about impact of distance, room noise on understanding



Review

- Consider the individual first.
- Evaluate the requirements of the setting and the properties of the equipment.
- Buy equipment from companies that will help you troubleshoot.
- Don’t forget the non-electronic communication tips!



Contact Information

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