

Part 5: Better Hearing: Electronic Devices

5c) Assistive Listening Devices (ALD's):

WHAT ARE ALD's?

ALD's are electronic devices, other than hearing aids, that help you hear better in tough listening situations that you encounter in the real world.

Some ALD's help you hear more clearly while others alert you to something that requires your attention. **Amplification Systems** help you hear more clearly. Examples include the headsets worn in movie theaters and houses of worship, and amplified telephones. **Alert (Notification) Systems** notify you when some event occurs such as the ringing of the doorbell or phone.

A) Amplification Systems

1. amplified phones
2. large area amplification systems
3. personal amplification systems
4. TV listening systems
5. coupling devices

B) Alert Systems

A) AMPLIFICATION SYSTEMS:

These devices enhance and amplify the sound, and bring it directly to your ears. Like hearing aids, ALD's make sounds louder but unlike most hearing aids which amplify all sounds, ALD's amplify the sounds you *want* to hear, while bypassing the sounds you *don't* want to hear such as chairs scraping, people talking, and air conditioners humming.

The best way to hear better is to get closer to the sound source.

And that's what ALD's do. They are placed at or near the sounds you want to hear. Here's what assistive listening devices can do for you:

- Eliminate or reduce background noise
- Overcome the problem of distance, putting the speaker right next to you
- Increase the clarity of the words

In addition, they are easy to use, require no custom fittings, and are far less expensive than most hearing aids.

Types of amplification devices and systems

1. Amplified Phones



Amplified phones can strengthen the incoming signal more than thirty times (up to 50 decibels louder). Most phones can also boost the higher frequencies, which is where most hearing loss occurs. This results in greater speech intelligibility because the consonants become clearer.

Many phones contain large buttons for the visually impaired, extra-loud ringers with visual indicators (flashing lights), and speed dial buttons. Some will even amplify the *outgoing* voice in case the hard-of-hearing person also has a soft or faint voice.

All phones are hearing aid compatible. To understand what this really means, we need to shed some light on the mysterious "T-coil." T-coil stands for telephone coil. It is a tiny coil of wire that fits in the hearing aid. About 30% of the hearing aids in this country contain T-coils. (You have one if your switch has a "T" setting.) It's a great thing to have because it enhances the clarity of phone conversations and can also help out in certain public settings. (See "Induction Loop System" below.)

Here's how it works. When the switch is set to "T", the microphone is turned off. It's a principle of physics that whenever current runs through a wire, it generates a magnetic field around the wire. So when current runs through the small speaker in your telephone handset it generates a magnetic field that, in turn, generates (induces) a current in the T-coil of the hearing aid. The signal, which has bypassed the microphone in the hearing aid, is amplified and passed directly into the ear. The signal is very clear and since the microphone is not being used, there is no feedback and no pickup of room noise.

2. Large-Area Amplification Systems

These auditorium-style systems are designed to help multiple users hear better in large area situations such as:

- houses of worship
- movie theaters
- lecture halls / auditoriums
- outdoor gatherings (FM system only)

All large area systems are wireless. In wireless systems, the sound is picked up from the person speaking and is transmitted through the air as invisible electromagnetic waves where it is received, amplified, and delivered directly to the listener's ears.

The user is free to move around since he is not wired to the sound source. There is no restriction to the number of people receiving the signal as long as they are within range. In large facilities you can easily have more than a dozen people receiving the amplified signal.



Receivers are compact, about the size of a "Walkman" or a deck of cards, while transmitters vary in size.

Transmitters for large areas are about the size of a toaster oven. Personal systems and TV listening systems use much smaller transmitters.

There are three types of systems, depending on the type of wave that is generated: FM radiowaves, infrared lightwaves, and magnetic inductive energy:

a) The FM system uses the same type of FM radio wave that you can pick up on a regular radio. It is probably the most common and versatile system in use today.

It consists of a small transmitter which acts like a miniature radio station, and a number of small portable receivers. The receivers and transmitter are all tuned to the same frequency ("station"). The transmitter usually sits on the stage or is connected to the sound system in the sound room. The signal can reach people more than 300 feet away.

FM systems can be used in adjoining rooms without interfering with

one another if the transmitters and receivers in each room are set to their own unique frequency.

Advantages:

- excellent fidelity
- portable and easy to set up and use
- low cost
- works equally well indoors and out
- large area coverage
- penetrates walls and other obstacles.

Disadvantages:

- may be subject to outside interference (police, fire, pagers)
- spillover into adjacent areas permit eavesdropping

b) Infrared Light system uses the same type of signal as your TV's remote control. These invisible light waves fall just below the visible spectrum. The receiver, often a headphone, has a little "window" that catches the light waves and converts them back into sound. This window must be accessible to the light. It can not be covered up or kept out of sight (as can the FM receiver).

Large area systems are commonly used in movie theaters. Lightwaves do not penetrate walls so transmitters in adjoining theaters will not interfere with one another. Large area infrared light systems are more difficult to set up than other systems. The transmitters must be set at the correct angle and may require more than one, so the system can be more expensive as well.

Advantages:

- Light doesn't penetrate walls (no spillover)
- excellent fidelity
- not subject to interference from radio waves.

Disadvantages:

- Transmitters and receivers must be unobstructed
- can be used indoors only
- high intensity lights and direct sunlight can interfere with signal
- systems for large areas are more expensive and more difficult to set up.

c) The Magnetic or Induction Loop system operates on a basic principle of physics that when electricity runs through a wire, it creates a magnetic field. In the induction loop system, a wire is laid around the perimeter of a room or activity area (like a museum exhibit). The transmitter, instead of sending the sound directly through the air as invisible waves, first pumps it through the wire, creating a magnetic field that fills the area within the perimeter of the wire. This signal can be picked up by a hearing aid with a T-coil (see above) or by a portable receiver.

Once set up, it is ideal for anyone with a T-coil hearing aid. No additional receiver is necessary. Otherwise, like the other systems, a receiver is required.

Advantages:

- long-lasting
- easy to operate
- no receiver necessary for T-coil wearers
- pickup areas can be precisely defined.

Disadvantages:

- subject to electrical interference from power sources and electrical equipment
- high installation costs
- "dead" areas may exist within loop.

3. Personal Amplification Systems

Personal systems are used in the home, in the restaurant, the car and the classroom, as well as outdoors. They are ideal for one-on-one conversations, small group discussions, and teacher/student interactions. There are two types of personal systems commonly in use: the **Personal FM** (wireless) and the **Personal Hardwired**.

a) **The Personal FM system** operates like the FM system described above, only it is much more portable. It is perfect for one-on-one communication and is typically used in a classroom. The teacher wears a lapel mike wired to a pocket-sized transmitter that is carried on his person. He can move about freely and everything he says is transmitted through the air and heard clearly by students equipped with receivers. (See above for discussion of how an FM system works.) The student's receiver usually comes equipped with its own microphone so, if he wishes, he can hear other students in the immediate area.



b) **The Personal Hardwired system.** Unlike the wireless ALD's which make use of radio frequencies, infrared lightwaves, or a magnetic field to transmit the sound, the hardwired device uses a direct electrical connection. It is a self-contained unit the size of a "Walkman" to which you can connect a headset, earbud or neckloop. The unit is placed closer to the person or group speaking and can usually pick them up quite

clearly.

4. TV Listening Systems

TV listening systems are wireless systems that transmit the sound from a TV (or other sound source such as a stereo or computer) to a receiver. A small transmitter sits on top of the TV and gathers the sound from either a small microphone placed over the speaker or from a cable plugged into the "audio out" socket on the back of the TV. Like other wireless systems, the sound is converted to radio waves, infrared light, or magnetic energy, transmitted through the air, and picked up by the receiver.

The headset has its own volume control and is independent from that of the TV's speakers. The headset can be turned up loudly while the TV's volume is set at a comfortable level for others in the room, or even turned all the way down.

Different systems have different advantages. The FM listening system permits you to walk into another room or go outside and still hear the sound but it is subject to outside interference and interference from other nearby TV systems. The infrared light system, on the other hand, does not penetrate walls but does allow you to have more than one system operating in the house without risk of interference.



TV Ears

5. Coupling Devices

A coupling device, such as a headphone, takes the signal from the receiver and brings it directly to the ear. There are several options, depending on personal preference and type of hearing aid, if any.

NO HEARING AID: Earbud or headset.

HEARING AID WITH T-COIL: Neckloop or silhouettes. These work by magnetic induction. The neckloop or silhouettes are plugged into the receiver. The neckloop is worn around the neck, like a necklace. (It can be worn under a shirt or blouse.) The silhouettes rest behind the ear. When electricity runs through them, they generate a magnetic field which is transmitted through the air to the T-coil in the hearing aid and into the ear. The advantage here is that there is no wire going from the receiver to the ear.

HEARING AID WITHOUT T-COIL: Headset, but feedback is a possibility unless the hearing aid is the in-the-canal type. You may need to remove the hearing aid.

BTE (BEHIND-THE-EAR) HEARING AID: Most BTE hearing aids have a T-coil so they can use the **neckloop** or **silhouettes**. Other options include the **DAI cord** and the **FM receiver boot**.

The DAI (Direct Audio Input) cord is a wire that runs from the receiver to a boot attached to the BTE hearing aid. (A boot is a little adapter that snaps into the bottom of the hearing aid to give the DAI cord something to plug into. The cord is too big to plug directly into the hearing aid.) This can produce a very powerful signal because the amplified signal from the receiver is further amplified by the hearing aid. The DAI cord can also connect directly to computers, tape recorders, and other audio sources.

The FM receiver boot snaps onto the BTE and can receive signals directly from FM transmitters. No other receiver is necessary. This is the ultimate in portability. This device should be fitted by an audiologist.

COCHLEAR IMPLANTS: A **DAI cord** (Direct Audio Input) runs from the receiving device to the speech processor.

B. Alert Systems

Alert ALD's *convert* sounds you need to hear into visual stimuli or vibratory stimuli, or they may simply amplify the sound so it can be heard. Some examples will give you an idea of how they work.

Lamps in various rooms can be plugged into special receivers so that whenever the phone rings, all the lamps flash. In this case, the signal is transmitted through the house wiring. You can place a small doorbell/transmitter at the front door. When somebody rings the bell, the transmitter sends an FM radio signal to receivers in various rooms which, again, cause lamps to flash on and off.

Instead of flashing lamps, you could have your wrist watch or beltclip receiver vibrate. If you can't hear the alarm clock, you could put a vibrating bedshaker under the mattress or pillow, or use a clock with a built-in strobe light.

If you want to hear the oven timer go off or be sure the baby is o.k., plug in a transmitter with a built-in microphone into a nearby outlet. When it "hears" a sound, it will send the signal through the house wiring to all receivers.

For the ultimate in effective low-tech, try the door-knock signaler. Simply hang it on the inside of your motel or dorm door. When someone knocks, a bright light goes off.

There are also base stations (master consoles) available which receive signals from different types of transmitters and indicate, via lighted icon, which event is occurring.