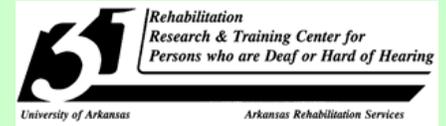




## Selected Proceedings of ALDAcon 2004 “Green Mountain Odyssey”



### "DEMYSTIFYING TECHNOLOGY OPTIONS FOR PERSONAL USE" Beth Wilson and Tina Thompson

**Beth Wilson:** My name is Beth Wilson. I am hard of hearing, a member of ALDA, and an engineer. What we are going to talk about today is trying to understand different types of technology, understand the advantages and disadvantages of each, and figure out where you can go to get more options

What we're trying to address here is the problem that hearing aids help sometimes, but not all the time. Sometimes we feel like we're being left out of the conversation. We are going to talk about ways to bring you back into the conversation. I want Tina to pretend that you're a hearing person, and I'm another hearing person. Hi.

**Tina Thompson:** Hi. How are you doing?

**Beth Wilson:** I'm doing great. How are you?

**Tina Thompson:** Great.

**Beth Wilson:** I'm at an ALDA convention.

**Tina Thompson:** How is that going? Keep talking. Hearing people don't have to look at each other when they talk.

**Beth Wilson:** And it's not hard for them to talk. They just have these words that go back and forth, and it doesn't bother them at all. They can talk all day and it doesn't make them tired. Now, let's pretend Tina's hard of hearing, but with the hearing aid, she can catch it. We have to pay more attention, because it's a little bit harder. And what happens if I look away? Communication stops! So the hearing aid helps us communicate, but if there's noise or I'm far away from the speaker, it's a little more stressful. And it's not as accurate because we're too far away or because there is noise. So how do we make it so that we can always understand? That's what this presentation is about.

Now, why would you want to use a signaling device? Two months ago, Tina and I were in a house fire. The fire alarms went off, but we weren't able to hear them, because they were high pitched. We depend on signaling devices to tell us that there is smoke or a fire. If that had happened at night, we wouldn't have heard the fire alarm. We have to depend on a signaling device to wake us up.

Another example would be that the phone is ringing and somebody is at the door, but a hard-of-hearing person with a newspaper would miss it all. We need to have a way to know that those sounds are being made. And that's when we use signaling devices.

There is a lot of technology out there. I think that is what makes it so difficult for us is that when you go to a convention or you look at a magazine, it looks like it should be something that should help. And when you look into it more, it's expensive enough, it better help! But there is a lot out there. And there are many applications.

There are applications that you would use for going to a town meeting or going into a government meeting. There is another set of solutions you can use in the classroom. There is technology used so that we can participate in the theater and the movies, churches, in the doctor's office, in the Medical Centers. We are not going to focus on that today. Today we are just going to talk about what can you buy for yourself that is for you to use in the home.

How does it work? Signaling devices work by catch, carry, signal. You have a piece of technology that will catch the sound, carry it to you, and then signal you. Tina is hard of hearing. What happens when the telephone rings?

**Beth Wilson:** Tina is not answering?  
(Telephone ringing).

**Beth Wilson:** Now I'm going to pretend to be a signaling device.  
(Telephone ringing)

**Tina Thompson:** Hello?

**Beth Wilson:** This is how a signaling device works. I'm going to somehow get the sound and alert Tina without using sound. Sometimes you use a light. Sometimes you use a vibrator. Something that will notify you that there is something happening in the house that is making a sound and you might want to pay attention to it.

The other thing is assistive listening devices. It's the same principle of catch, carry, and couple. But now what we will do is catch the signal, carry it to the person with a hearing loss, and then either bring it into the hearing aid, or bring it in with a headphone, or have it coupled with the T coil. Now, if we have a wired signaling device, then when someone speaks, it carries it directly to the person, and they are able to hear this conversation.

For those of you that have a T coil in your hearing aid, it means you can use a loop. You can couple your hearing aid with magnetics. If you have a hearing aid that has a

direct input, you can tap into that directly. Just like if you either have a hearing aid that has no T coil, you don't have a hearing aid, or you don't have a way to patch into the cochlear implant. If you have a CI, some have T coils and some have patch cords.

We are going to talk about assistive listening devices first. We talked about things being hard wired, versus wireless. A hard-wired system has a wire directly. You have a microphone you're holding out and nothing is wireless. Wireless means that you have a transmitter and a receiver. When it's wireless, you'll have a transmitter that catches the signal. And it's going to transmit the sound to a receiver, which you're going to then be able to use on your end. There's three ways that we can talk about wireless. One is FM, which is radio. The second is infrared, which is by light. And the third is induction, which is magnetic.

Let me start with the wired first, though. The most common hard-wired device is something that is a handheld amplifier: Pocket Talker, Sound Director, Sound Wizard, Personal Listener. There are a number of different companies that make these.

So say you are talking about a handheld directional microphone that you point the microphone at whomever it is you want to hear. If somebody is talking to you and you don't want to hear them, there is some advantages there, too. The advantage is you carry it around. It doesn't require that you do anything in advance.

The disadvantage is you have to come up pretty close to the person and they feel like they are on the news at 11. The only difference is that you don't put it back to yourself; you just keep sticking this microphone at them. When my mother went to her first SHHH convention, she said, "I was so startled; people keep sticking things up my nose."

And I said, "Mom, it's not your nose that they are interested in. They wanted to know what you're saying."

She said that the first day scared her to have people putting their microphones in her face, but by the third day, she started parading around like a rock star, because she was being interviewed. That's how she thought of it. You can't be shy, because you've got to put the microphone right up to the speaker. I have bought devices like this for \$100. I have seen some that are \$200. I'm just trying to give you a price range.

Infrared is where we use light. For example, a person talks into a microphone that is being transmitted by light waves and then you hear it on the other end with the headphones. You're using light, which means you have to be able to see the transmitter. Have you ever seen infrared used at a movie theater? There's a red light up at the ceiling. That is infrared—being transmitted by light. One of the advantages is that you have to be in the line of sight to use it. That's why the theaters use it—because you have to buy a ticket and go into the room to be able to watch the play. Especially the Broadway shows, they are very worried about somebody being outside and recording. They are not going to use FM because you don't have to be in the room to hear it.

Infrared is also what we have recommended in courtroom applications, because it's line of sight and you can't hear it outside the room. As an engineer, I go into classified settings. I can't use my hearing aid equipment, but I can use infrared, because it's line of sight.

One disadvantage is that sometimes it's complicated to set it up. It can be a bit more intimidating. The other disadvantage is if you block the light signal, it will stop. Also, because it's light, you can only use it inside, and if there are strobe lights, it will interfere with it.

I went to see the play "Cats", there is a part of the play that has the strobe lights, and I couldn't hear any of that music because the white light interrupted the signal. It happens with cameras, too, because you hear the pictures, because it's light.

Now, if you're going to put in a system, that can be more expensive. If you get a personal system, that can run about \$200. And there are applications that are nice in the home to use a personal system, like when you're watching TV.

**Audience Member:** How do you control where the amplifier is aimed to pick up the speaker? With a mic, you can move your hand. But how do you move your line of sight?

**Beth Wilson:** If you're using infrared, then the microphone will pick it up and send it to a transmitter. The receiver has to be line of sight. So you can still use a microphone and point it at the sound source, but you have to be in the room to hear it. If you go to the next room, you won't hear anything that was said in that room. The infrared is lights. The only interference you'll get is from other light or when you leave the room and you no longer are in contact with the light.

With FM, you're still going to use a microphone, you're going to put it into a transmitter, but now the transmitter is by radio waves. When you think of FM, it's the same principle that you tune a radio station in your car. You know how you turn the knob a bit, and you get a different station every time? That is how FM works: You pick up whatever is being carried on that station.

The ALDs that you can borrow at the ALDAcon are FM. You have to find this room right now, this microphone, is transmitting to an FM transmitter somewhere. I could hear it outside the room. It's a frequency that you pick and that's how you get sound.

I have an FM transmitter and receiver that I use at work. I wear the receiver, and I have a loop so I can hear it through my hearing aid. Then, if I'm in a class, I'll give the instructor my transmitter and they wear the microphone.

Now, what if they get nervous about wearing the microphone? I tell them it's the same system that the referees use in the NFL. It's not quite, but it's the same principle. And every one of my instructors puts the microphone on here, and wears the transmitter in

the back of their pants, just like NFL referees. And so then, it seems like it's something good to do.

The advantage is that now you can be at a distance from the speaker, because you put the microphone on the speaker, and you don't have to be pointing it at them. We use FM when we go out in kayaks, because by the time I tell her to wait for me, because she is kayaking ahead of me, she is gone. And unless one of us is going to kayak backwards -- and neither of us is that good -- we need something to be able to talk to each other. So, wearing an FM system, we can talk to each other. We are very careful about putting it in a dry bag. It works very well. By the time I came out of the water, I was soaked, but my FM was dry. The disadvantage is that sometimes you can only hear the person talking.

**Audience Member:** With the FM, if you're using it in water or whatever, you have to have something in your ear? How do you keep that dry?

**Beth Wilson:** The FM I had had a wire and an ear mold, so I wasn't swimming with my hearing aid on. I have an ear mold that connects directly to the FM. I have a Phonak MicroLink. Phonak ear makes a Lexis. There are a number of these products out. Mine cost a thousand dollars for a transmitter and then I have a receiver that also cost a thousand dollars. It fits on the bottom of my hearing aid. I'm using a Phonak transmitter, a Phonak receiver, and a Siemen's hearing aid. So there are ways to couple it to different hearing aids.

**Audience Member:** Can you use a remote watch for the Phonak? It's very important for me to have control, rather than fiddle.

**Beth Wilson:** Because my switch is up here and I haven't gotten used to it, sometimes I have to take out the hearing aid to flip it. She is talking about a remote control watch.

**Audience Member:** But that is expensive, too. I have a Phonak. There are the buttons on the side, for the mode, and then on the other side is volume.

**Beth Wilson:** Someone asked me if I needed my T coil. When I use this device, that is FM, it couples into my hearing aid, FM, directly. I'm not using the T coil at all. It's strictly FM. I just bought this, because I had the fire and I lost my hearing aid. My hearing aid cost me \$2,000, the boot was \$1,000, and my transmitter was \$1,000. \$4,000 for the whole package.

**Audience Member:** Did I hear you say it worked? You kept the microphone on and also listened?

**Beth Wilson:** If I'm using an FM transmitter receiver, like a Williams sound or Phonak ear, when I wire them up with a transmitter and I wear the receiver, the only person I can hear is the person on the microphone. When I use the Phonak FM, and it's connected to my hearing aid, my hearing aid has the option of the Phonak microphone only if I really don't want to listen to my neighbors. Or I can hear everybody around me

through my hearing aid and the person on the microphone. So I get both. I put the microphone where I want all the voices. I also use a conference mic sometimes. Instead of a directional microphone, I'll use a conference microphone in an office setting, and pick that up.

**Audience Member:** Does the FM device have any filtering capabilities?

**Beth Wilson:** Yes. That's the reason that I pick it up. I set it on the table—yes, I hear everybody tapping their pen, and yes, the microphone is going to pick up everything that is coming to it.

Now I'll talk about magnetic. If you have T-coils, it's nice when a loop system is there. All you have to do is flip the hearing aid to T. It's great. The microphone picks everything up and puts it into a wire that is creating a magnetic field that you pick up in your hearing aid. The way this works is, if you are inside the loop, you will hear it through your T coil on your hearing aid; if you have a T coil. You don't have to do anything. You step into the loop, flip on the T-switch, and you hear it. There are some buildings that have this. At our SHHH chapter meetings, we have a loop in the ceiling. If you just walk in, you're able to get it. It's very convenient. You don't have to say excuse me, I'm hard of hearing. I need you to wear this equipment. If you show up late, you don't have to stop them to wire them up. So, the magnetic solution is nice for that. Sometimes it requires something to set it up. We put the loop in a ceiling. If you loop a set of chairs, you've got to make sure that you tape it down so that nobody trips over it.

**Audience Member:** What other things can interfere with the signal on the magnetic?

**Beth Wilson:** There is a lot that can interfere with magnetic. For one thing, the device that keeps the fluorescent light running has a 60 hertz hum. And that will interfere with it. You will walk into the room, put your T coil on and you hear a hum. There is also a magnetic hum that is emitted from anything that is high powered. So if you're in a subway, if you flip your T-switch on, you're going to hear all the hum from the electricity. The magnetic signal is picked up from the electricity running through the wire. So if you're near a high power line, you're going to get a hum.

If you have a cell phone and the battery is pulsing, if you have AT&T or Cingular, the wave form that is used for that pulses the battery. So, unless the battery is shielded, it will interfere with your hearing aid or the T coil. Some phones, even the Verizon and Sprint, use a different wave form that doesn't pulse the battery. But the backlight will interfere. Sometimes when you put your cell phone up to your hearing aid, the T coil, you'll just get a hum until the light goes off. The light is interfering with it, because the electronics to power that light creates the hum.

There is also a problem with some of the higher gigahertz cordless phones. I have a cordless phone but I can only use a 900 MegaHertz. If I go to anything that is gigahertz, it interferes. That is against the law by the way, but they have gotten away with it. And I personally file a complaint every time I use a phone that interferes with my hearing aid.

Because the federal law states that they are not allowed to make something that interferes with our T coils.

**Audience Member:** What causes the interference? When I walk into a room that has the light sensor, when you walk into the bathroom, the light turns on, what causes that?

**Beth Wilson:** The light sensor. What is happening, it's powering the light on. Magnetics come from induction, and induction comes from electricity flowing through a wire. It creates a magnetic field around it. Now, when electricity is flowing normally like in this room, you won't get that magnetic field. But if you have a sensor that triggers it, then you get the hum from the sensor. Some electronics, if they come on or pulse, if it's not a steady flow, then you get the hum. It's a pulsing of the electricity. I also get it from some computer screens. It's the refresh rate, so some of the ones with high end graphics, the screen will hum. I actually had somebody that was hard-of-hearing say to me, "Well, the screens all make noise."

I said, "No. That is a private song we're hearing. Hearing people don't hear that. It's just something that we hear in our hearing aids." Anything that is pulsing like that causes a magnetic field.

**Audience Member:** Does that include air conditioners?

**Beth Wilson:** Some, yes. It depends, also, on where the battery is, or if it has a transformer, how close the coil is. If the transformer is inside something that is shielded, then you won't get the interference. If the transformer is up near the front of the machine, you walk by it and you get the noise, it depends where the transformer is or where the battery is.

**Audience Member:** Do you only hear that hum when your hearing aid is on T or also on microphone?

**Beth Wilson:** I only hear the hum when my hearing aid is on T. Magnetics is very sensitive to orientation. So, when I was working in Alaska, I was working on a radar, and I had to put my T-switch on to use the telephone. But they had all these electronics around me that interfered. So I'd be trying to talk on the telephone and I found out that if I stood a certain way and did certain things with my body, I didn't get a hum. But everyone who came in the room wondered what was wrong with me.

Some hearing aids are really good with phones, but they seem to be bad with the loop. It depends on your hearing aid. It depends what way that coil is situated in your hearing aid. If you pick up the phone and you can't hear it that well, turn it a bit and it will come in clearly.

I just want to touch a bit on microphones. We talked a bit about things being omni-directional and directional. Omni-directional means that when you put the microphone down, you'll hear everybody. When you put the microphone in the middle of the table at Thanksgiving, you're going to hear everybody's conversation. Sometimes that's good.

Sometimes it's not. If you get a directional microphone, you're only going to get the people that you are pointing at.

**Audience Member:** Even with the directional microphone, will you not also get environmental noise with it?

**Beth Wilson:** You will somewhat. But you won't get what's behind you now. That's important, because if, say, we're outside talking and we're having an intense conversation, and there is another conversation going on behind me, I don't want to hear that. I just zoom in on you and you're the only one I hear. If I have an omnidirectional microphone, I'm going to pick up your voice and I'm going to pick up the voice behind me.

**Audience Member:** Have there been any developments in stereo microphones to assist with directional localization?

**Beth Wilson:** I'm not sure. I know that the technology that goes into audible microphones is not used in hearing aids.

Let's talk about signaling devices. I brought with me my shake awake. But what I'd like to do is introduce you to the person who developed the prototype for the shake awake.

**Tina Thompson:** I've been hard-of-hearing all my life and, while I was growing up, there was no assistive technology of any kind. Unfortunately, I depended on people to let me know the phone was ringing or wake me up in the morning, that sort of thing. That was fine when I was a little kid. But when I went off to college, I would always sign up for a class that was later in the morning, so I would never be late for class. That technique worked fine while I was in college until I graduated and got my first real job, which meant I had to go to work early in the morning. Before I started working, I was nervous about how I was going to solve this problem of waking up in the morning.

One day I was in the shower and I was shaving my legs with an electric shaver. I'm shaving and I realize the shaver had a vibrating feeling. I thought, if I put this under my pillow, I would feel the vibration. So, I attached the shaver to a timer and set the timer to go off at 6 or 7 o'clock in the morning. I had the regular alarm clock and the timer attached to the shaver. It worked beautifully. I was very happy. I got up in the morning and it worked great. The only thing I didn't do was patent the idea.

**Beth Wilson:** There are other products out besides the shake awake. You set the time that you want it to go off. It has is this little front part that covers it up, so that if you rolled over on it in the night, you don't turn the alarm off. When the alarm goes off, the thing vibrates under your pillow and wakes you up.

Before the fire, Tina had a device that is called a universal signaler. It picks up any sound and will make the bed vibrate. There are also doorbells you can wire in the systems. There are portable door knockers, that if you knock on the door the light goes off. Smoke detectors have strobes. Any device that has a strobe requires that they

be hard wired. If it's hard wired and the cause of your fire is electrical, like ours was, the strobe doesn't work on the battery backup. So the solution we are going to do is put in the strobe lights for the fire alarms. But in addition to the universal signaler, we are going to put on a battery backup, so that it will work even if there is no power.

There are all kinds of alerting systems. One works so that when the phone rings, the lights flash on and off. There is also amplification for phones. You can get phones that have the amplifier built in. You can get attachments to the phone. If you just want an attachment to hear the phone louder, it's \$25. If you want a phone that will have the amplification in there, light up, have a TTY in it, and telling you the time, then it goes about \$300. The more features they have, the more expensive they become.

The most important device I have in my home is caller ID, because when the phone rings and I pick it up, the first couple seconds that the person is talking, I have no idea what they are saying. I'm trying to figure out who they are. If I have caller ID, not only can I use it to say I'm not answering the phone to talk to this person, I can also use it to say, "Oh, I know who that is, and when I know who they are, I imagine what their voice should sound like. And when I pick it up, I understand better." Otherwise, you've got to make them start over again when you figure out who they are.

All the televisions, since I think it's '91 or '92, have to have closed captioning built in. Now, we did not create the law in such a way that it has to be easy to find the captioning, but it has to be built in. Every time I go into a bar or a restaurant, I tell them to put the captioning on, because I know they will never figure out how to turn it off.

SHHH has a number of articles that explain different devices and also references to places that you can get information. There is this particular loop, [www.hearingloop.org](http://www.hearingloop.org). It's a wonderful website and explains well how loops work.

And so in summary, technology offers a lot of solutions. You just need to figure out if it's the right solution for you.

**Beth Wilson has presented often on the subject of technology, but her most popular presentations have been at an introductory level mixing humor and personal experience with information. Beth earned her Ph.D in Electrical Engineering, so actually understands how these things work. With the exception of her time as Executive Director at SHHH from 2001-2002, she has worked as an engineer at Raytheon Company since 1983.**

**Christine Thompson is a recent graduate of the Hearing Accessibility Technology training. Since rigging up an electric shaver to a timer to serve as an alarm clock while in college, she has sought out simple technical solutions to accommodating her hearing loss. Tina earned a Masters in Social Work and has been working in the field of child welfare since 1980. As a social worker, she will make sure the presentation stays low-tech.**

This paper was originally presented at the ALDAcon held in Burlington, Vermont in September of 2004.