

Stethoscopes and Hearing Aids

By Michelle Noland, Cardionics, Inc.

Cardionics is a manufacturer of electronic stethoscopes. We are not audiologists or hearing aid specialists. However, through helping customers, working with hearing aid manufacturers and conducting our own tests with hearing aids, we have become familiar with the problems encountered by the hearing impaired professionals and have developed a number of solutions.

In-the-Ear (ITE) type Hearing Aids work well with the E-Scope Hearing Impaired Model Electronic Stethoscope, Cat. No. 718-7710. Earpieces are unnecessary with ITE hearing aids so this model (see Figure 1) has been modified so as to eliminate them. External, low-frequency headphones (supplied) are placed over the ears without removing the hearing aids. The headphones are modified from a commercially available headphone (Koss). These headphones are individually tested for low frequency then serialized. The test records are maintained permanently.



Figure 1 – E-Scope Hearing Impaired Stethoscope, for ITE

There are two types of headphones – the traditional headphones, cat. No. 718-0405, (Figure 2) has a bridge that fits over the top of the head. The “active style” headphone, cat. No. 718-0415, (Figure 3) has a bridge that fits behind the head. These headphones use identical speakers. The only difference is how the bridge fits. The active style tends to be less noticeable. It also has only one cord connecting it to the E-Scope.



Figure 2 Traditional Style Headphones



Figure 3 Active Style Headphones

Headphones get a great deal of wear. It is a good idea to have two pair – one as a back up. With normal wear and tear, you can expect them to last about a year or two.

Behind-the-Ear (BTE) Hearing Aids present a more difficult problem as the hearing deficit of the professional user is generally more severe. When people lose their hearing, it is usually in the frequencies in which voice sounds are heard (500-4000Hz). Heart sounds, on the other hand, are much lower. The first and second heart sound are between 70-120Hz. Murmurs are generally found between 150-400Hz and breath sounds fall between 70-2000Hz with occasional frequencies up to 4000Hz.

Hearing aids reproduce voice very well. Heart sounds and Korotkoff sounds are another story. Hearing aids just don't reproduce these sounds well due, in part, to the very small speaker. Cardionics has tested several current model hearing aids with the E-Scope by inserting a known sound into the E-Scope and measuring the output. We then attached a hearing aid, inserted the same sound and measured the output from the hearing aid. The results have been published in Technical Information Bulletin No. 101 by Cardionics. Copies are available upon request. The sound output from the hearing aid lacks the sound quality needed to properly diagnose a heart sound. Increasing the volume merely distorts the sound further.

As a result, we are reluctant to recommend a silhouette or direct audio input cable (DAI) for use with a BTE hearing aid. They should be used only as a last resort and by order of an audiologist.

Many of the newer hearing aids have an “open fit” style. That is, the tube that is inserted into the ear does not completely occlude the ear canal. In this situation, the user generally has some low frequency hearing capability. For this type of hearing aid, we recommend the E-Scope Hearing Impaired Model, cat. No. 718-7710 with the 718-0405 traditional style headphone.

Cochlear Implants (CI). There are three manufacturers of Cochlear Implants with whom we have worked – Cochlear America, MedEl and Advanced Bionics. Advanced Bionics has a frequency limitation. It will not reproduce frequencies below 250Hz so it is not recommended for use in cardiac auscultation or taking blood pressure.

By attaching a thin cable to the speech processor and mapping the CI properly, heart, breath, bowel and Korotkoff sounds generally can be heard quite well. One of the employees at Cochlear America given us a written guide to mapping the Freedom Nucleus CI with the E-Scope. Please contact us for a copy of these mapping instructions.

BAHA (Bone Anchored Hearing Aid). The E-Scope has been successfully used with BAHA implants by connecting it to the Audio Adapter Cable supplied as part of the BAHA. The user must increase the low tones of their processor for best use.

Cardionics has had a good deal of experience in this area. Please don't hesitate in calling us if we can be of help.