

B - Body Aids

Body worn hearing aids were the first portable electronic hearing aids. Harvey Fletcher, a physicist from Provo, Utah and the father of stereophonic sound invented the first body aid while working at Bell Laboratories.

B1 Vocalizer by Zenith Radio Corporation, Vacuum tube hearing aid, circa 1957. A wire would plug into the top of the hearing aid and a speaker in some type of earmold or ear coupling device would be at the other end of the wire. The user would put this speaker into her ear. This body aid had a volume control and a dial that let the user choose to amplify acoustic sound, electromagnetic waves from a telephone or both acoustic and electromagnetic waves.

B2 Zenith Crusader II. Transistor hearing aid, circa 1969. Slightly thinner, smaller, and lighter than vacuum tube hearing aids. Advanced body aids had a control for tone and another control for gain (volume)

C - On the Ear, Over the Ear, Behind the Ear Hearing aids. Typically referred to as BTE devices. These devices sit on the ear. The amplified sound is directed into a tube and then directed into the ear with a custom earmold or in some instances a dome.

C1 Acousticon Privat-Ear. Circa 1958 A transistor hearing. There were right and left models.

C2 Otation Serial # 2130. We were unable to find any information regarding this hearing device.

Typical acoustics for items C-1 and C-2 were amplification of sounds from 200 through 1800 Hz and average 38 dB of gain.

Items C3 through C6 modern hearing systems typically amplify sounds from 50 through 18,000 Hz and can average 70 dB of gain. These items are also digital hearing aids. In 1996 digital hearing aids became available to all consumers worldwide.

C3 A power hearing aid. Notice the device is approximately one quarter the size of the Privat-Ear (C1), 3 times more powerful and a frequency response that is over 10 times wider.

C4 A modern blue tooth hearing aid (with a custom earmold) that can pair to telephones, televisions and more. Smart apps on the user's phone allow the user to customize the sound experience to their preference or environment.

C5 A Mini BTE with wireless connectivity and a remote control.

C6 A slim tube BTE with a dome. Most modern BTE hearing aids can be configured this way. Advances do to digital technology enabled scientists to create devices that would amplify sound and let the ear remain open, to take advantage of residual hearing. The first open hearing aids were slim tube. Today most open fittings are done with RIE/RIC/RITE style

D Receiver in the Ear (RITE, RIE), Receiver in the Canal (RIC)

The strength of the receiver (Wire extending from the device to the ear) can be changed in the field. RIC's are versatile in that they can easily be re-configured with different receivers and ear coupling options to accommodate a mild to profound hearing loss.

D1 Mini RIC with a custom earmold. Circa 2008

D2, D-3 RIC with varying domes

D4 A menagerie of various dome styles and configurations.

D5 A full size RIC which can be configured to fit a slight high frequency hearing loss to a profound hearing loss.

E & F Specialty Hearing Devices

E Beltone FrontEar Eyeglass Hearing Aids. Bifocal Vision and Binaural Hearing all in one. Eyeglass hearing aids were popularized by Eleanor Roosevelt in the 1940's. While popular from a fashion standpoint. Eyeglass hearing aids never fully "caught on" the inconvenience of having your ears and eyes together did not outweigh the benefit. Occasionally people still ask if eyeglass hearing aids are available. A brief perusal of the internet will reveal a myriad of hoaky online retailers espousing the benefits of their stealth eyeglass hearing devices.

F-Bone conduction Hearing aids.

We can hear via vibrations through our bones. After maturation, the human skull is the hardest bone in the body. The skull makes an excellent transducer to transfer external vibrations directly to the inner ear. Johannes Jorrison's medical dissertation at Halle in 1757 was on the subject of bone conduction hearing. Johannes "discovered" bone conduction hearing when his hard of hearing father, accidently leaned his smoking pipe against a harpsichord and proclaimed, "I can hear the music distinctly!"

Today bone vibration hearing aids vibrate the skull with an oscillator. The oscillator vibrates the same wave pattern as the sound wave and directs the vibrations into the skull. Which carries the vibrations to the cochlea.

F1 Beltone Slimette-Eyeglass bone conduction hearing aid. This oscillator would replace an eyeglass stem and vibrate the mastoid.

F2 Fidelity Eyeglass stem bone conduction hearing aid.

F3 baha, Cochlear corporation. A post is surgically implanted in the mastoid. After approximately 6 weeks, the post osseo integrates with the bone. The baha snaps on and off the post at the user's discretion.

F4 Sophono. A steel plate is surgically inserted under the skin of the mastoid. Four screws hold the plate to the mastoid. The skin heals over the surgical incision. The Sophono oscillator magnetically couples to the steel plate and transfers vibrations to the skull.

F5 Oscillator that can attach to the mastoid with either a soft band or hard band. These are typically used to treat temporary conductive hearing loss in children or while surgical candidates wait for their baha or Sophono. The oscillator must be tight on the mastoid. The headbands squeeze the head and can cause discomfort if worn for extended periods.

G- Deep insertion devices.

Developed by InSound medical released in 2008. These hearing devices are inserted into the patient's ear by their doctor of audiology. The user wears them 24/7. The devices do have a sealed battery after 4 to 12 weeks the battery depletes, and the patient comes in to have the device replaced.

H-Custom in the ear devices.

H1 In the Ear (ITE) The electret microphone

introduced in 1971 allowed in the ear and ever smaller hearing aids to develop. The electret mic was not as prone to mechanical vibrations as previous microphones. The microphone could now be placed in the same case as the receiver.

H2 In the canal (ITC) hearing aids were introduced in 1993. By 1989, ITC's dominated 20% of the hearing aid market.

H3 Completely in the Canal hearing aids were introduced in 1993. The ever progressing miniaturization of components, in the case of the CIC, specifically the Knowles amplified receiver allows hearing aids to be built to fit completely into the ear canal.

Two U.S. manufacturers located in Minnesota introduce the CIC. European manufactures were slow to adopt to the changes. For the first time U.S. hearing research outpaces and out innovates the European stalwarts. It is argued this shift in research launched the modern hearing market as we know it today; including ear buds, wireless telephones and streaming audio which led to streaming video.

H4 Invisible in the Canal (iiC) introduced in 2010. The one remaining manufacturer that invented the CIC further reduced the size of custom devices and released the iiC in 2010. Since that time, all remaining manufacturers have released their own version of the iiC.

What's next? No one knows for sure. But hearing aids with sensors to detect everything from geo location, velocity, blood oxygen level, blood sugar level, BP, heart rate and more are in alpha testing.

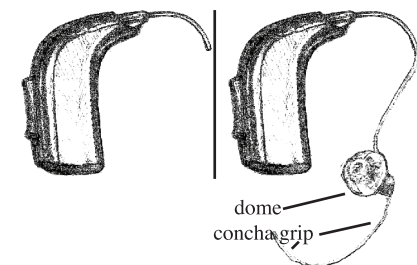
drhear museum

A - Ear Trumpet

American Buffalo Horn, Circa 1836, San Antonio Texas.

Hand carved, hollowed out horn, held up to the ear. Sound waves directed towards the entrance (larger end) of the horn amplify as the sound waves travel down the natural funnel shape of the horn. Additionally, sounds not directed towards the trumpet (background noise) are reduced by approximately 3 dB.

Note items in categories B through E must have some type of coupler to direct the treated sound into the ear. Many people have inadvertently stated they saw a hearing aid that had nothing whatsoever placed in the ear. Most likely these people simply saw a hearing device only, without the ear coupler attached. This illustration shows a hearing device with and without an ear coupler. If the device is an air conduction hearing aid, something must be placed into the ear



Hearing Device sans coupler Hearing Device with a dome