

# Signal processing in hearing aids

This is the second of a series of articles “getting to know your hearing instruments – inside and out”. Today we focus on signal processing – the next issue will cover receiver technology.

**Signal processing can be described as what happens inside a hearing aid after a sound has been detected by the microphone, and before it is delivered to the receiver (or loudspeaker).**

You may have heard of analogue and digital hearing aids and wondered what that really meant. In basic terminology, the difference between the two is whether the signal processing is carried out by electrical components or by digital signal processing. The difference could be likened to a stereo that has simply a bass and treble to adjust the sound (analogue aid), or whether it has a graphic equaliser where many components of the sound can be changed (digital aid).

## **Analogue Signal Processing**

In an analogue hearing aid the signal received by the microphone is modified by electrical components such as capacitors and resistors before passing to the amplifier and being heard by the wearer.

Audiologists controlled the output of these hearing aids with a small screwdriver that turned a trim-pot. The adjustments were limited to perhaps how much low or high frequency power was relayed to the client, and in some, the maximum output of the hearing aid. Analogue sound is like receiving a photocopy, and it causes deterioration of the original signal.

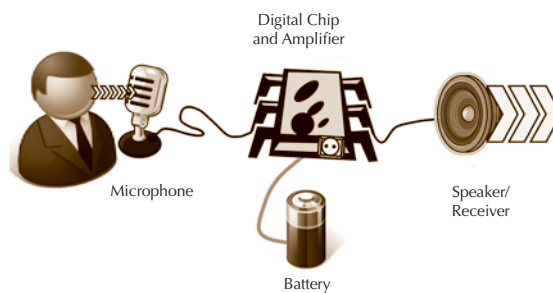
## **Digital Signal Processing**

In a digital hearing aid, the sound still has to go through the electrical components of the microphone and the amplifier, but the way in which the signal processing is carried out is digital.

Once the sound is received by the microphone it passes to an analogue to digital converter.

This means that the analogue sound wave is converted into a digital signal, ie 1's and 0's. Once the signal is digital, it is processed, then passes through a digital to analogue converter, onto the amplifier, and then is heard.

Depending upon the hearing aid, the digital signal is broken up into a number of frequency bands. In each of these bands a number of changes can be made to the digital signal. So, for example, in one of perhaps 20 bands a signal can be modified to provide different outputs for soft, medium, and loud sounds! It can also be told to respond differently depending upon the sounds present in adjacent bands. A typical digital hearing aid is really a very sophisticated and miniature computer that makes millions of processing decisions every second, and still delivers a sound that appears to be in real time.



If you would like to book in for a hearing aid review please call Debbie on 264 0405 to make an appointment.