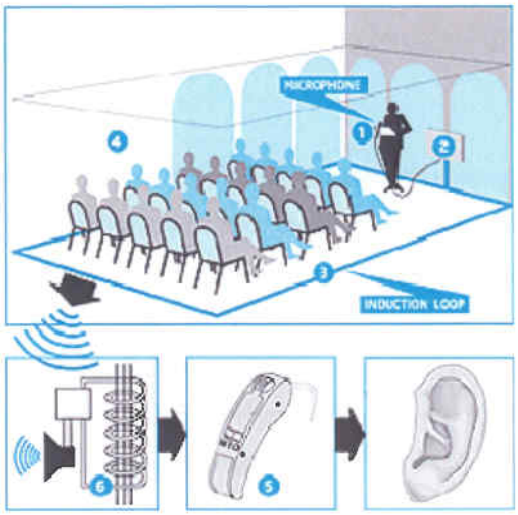
## How do induction loops work?

An induction loop system transmits an audio signal directly into a hearing aid via a magnetic field, greatly reducing background noise, competing sounds, reverberation and other acoustic distortions that reduce clarity of sound.

This diagram illustrates how they work.




Audio Inputs **1**, either from an existing audio source such as a P.A. system or from dedicated microphone inputs feed an audio signal into an Induction Loop Amplifier **2**. The amplifier drives a current into a Loop **3** or series of loops. As the current flows through the cable it creates a Magnetic Field **4** in the required area – careful loop and amplifier design ensures that the vertical component of the field is even and free of dropouts and dead zones wherever the user might be. Inside most Hearing Aids **5**, a small coil known as a Telecoil **6** picks up the magnetic field signal, which is amplified into a high quality audio signal delivered directly to the ear of the hearing aid user.

## How do induction loops work? - Technical information

Not all hearing-aid users and technicians / system installers can be expected to know the answer. Many have not heard of such things, and do not understand the great help an induction loop can be to users of hearing aids in compensating for their disability. So, the following explanation may be of some help in enabling non-technical persons to understand how an induction loop works.

Most hearing aids nowadays have a switch marked M and T. Some even have M, MT and T. The M (microphone) position is for "normal" listening, that is receiving airborne sound via the microphone built in to the hearing aid. The T (telecoil) position is for receiving the sound via an induction coil which is built in to the hearing aid.

For the induction coil to provide sound, a magnetic field is needed via which the sound is transmitted. This facility in hearing aids was introduced by a number of manufacturers many years ago and was then known as the "telephone" or "telecoil" position on the hearing aid switch. It was intended to make it easier for the hearing aid

user to hear over the telephone, by picking up the sound via the magnetic field generated by the diaphragm coil in the receiver of the telephone.

In many locations, telephone handsets now have this required capability. In recent years, however, induction loop systems have begun to be provided in public places such as churches, cinemas and theatres, bank, ticket and information counters and desks. It is even found in the home. In all these cases the T facility is used in to listen inductively, without the interference of airborne background sound. The MT position which is provided on some hearing aids allows listening simultaneously both to airborne sound via the microphone and to inductively transmitted sound via the telecoil.

It is well known that when an alternating current is passed through a wire, a magnetic field is generated around the wire. If a second wire is brought within this magnetic field, a corresponding alternating current is created within the second wire. In technical language, it is said that a current is "induced" in the second wire. Hence the term "induction". This particular magnetic principle is the basis on which electrical motors, electrical generators and transformers operate. An induction loop for hearing aid purposes also operates in the same way. An induction loop system consists of an amplifier and a loop. The amplifier can be connected to a sound source such as a TV or radio, a PA / sound reinforcement system or a dedicated microphone.

The signal is amplified and fed into the loop cable, in the form of a strong alternating current. The loop itself consists of an insulated wire, one turn of which is placed around the perimeter of the room. When the alternating current from the amplifier flows through the loop, a magnetic field is created within the room. If a hearing aid user switches their hearing aid to the T position, the telecoil in the hearing aid picks up the fluctuations in the magnetic field and converts them into alternating currents once more. These are in turn amplified and converted by the hearing aid into sound. The magnetic field within the loop area is strong enough to allow the person with the hearing aid to move around freely within the room and still receive the sound at a good, comfortable listening level. The performance of these systems is specified in agreed international standards.

Some loop layouts are not simple single wire surrounding a room, but the above explanation covers the basic principles.