



William W. Perrine

EXTEND YOUR HEARING WITH VARIOUS ASSISTIVE LISTENING INSTRUMENTS

William W. Perrine, MS., C.C.C.A.

INTRODUCTION

Aural Rehabilitation could encompass more than a hearing aid(s) in order for a hearing impaired individual to achieve maximum hearing assistance. Because of certain environmental situations such as background noise mixed with speech sounds, substantial distance between speaker and listener, and/or reflection of acoustical stimuli within a room, the speech sounds that reach a listener's ear will seldom be free from degradation. A hearing impaired person's speech perception in noise is more likely to decline compared to listeners whose hearing was within the limits of normal (Finitzo-Hieber and Tillman, 1976). Therefore amplifying the listener's surroundings with a hearing aid may not allow speech to be understandable due to the interference level of noise. By utilizing Assistive Listening Devices (ALDS) in conjunction with hearing instruments, the hearing impaired listener's ability to hear or to be aware of the desired message within the environment will be maximized.

Assistive listening devices can be

categorized according to electro-mechanical features or by specific listening needs they fulfill. This discussion of ALDs will be grouped in regards to the listener's needs; listening systems and awareness systems. Although each system contains many different types of devices, only the widely used models will be discussed.

Although the performance of all listening systems depend upon a person's hearing sensitivity and/or speech discrimination ability, the primary goal of listening devices is to increase the desired signal level (speech) while simultaneously decreasing the unwanted sounds (noise). In order to reach the desired signal to noise ratio, each system must consist of a microphone (located close to the desired signal), a transmitter/amplifier (to send and increase the volume), and a receiver (to collect the signal and changes to the desired acoustic response). Through assistive listening devices, the desired signal may be extended to the ear. A brief description of each listening system is listed below.

HARD WIRE SYSTEM:

The oldest and simplest ALD available is the hard wire system. The listener's receiver is connected by a wire to the amplifier. The main advantage of a hard wire unit is the

high fidelity and high level of output due to the close proximity of the microphone to the sound source. Typically, this unit is employed in church, classrooms, and auditoriums.



Due to miniaturization of electrical components, a personal hand wire amplification unit is available. A personal hand held system can be utilized as a backup to a conventional hearing aid or as an alternative solution for a listener who is not capable of operating a hearing aid. Although the personal hand unit involves maneuvering around wires which connect to the earphone and/or microphone, the unit is fairly inexpensive compared to personal hearing aids.

The obvious disadvantages of the hard wire system include the necessity of a physical wire connection between all components of the unit. Also the listener must have close access to an output jack in order to connect the receiver to the complete system which limits the listener's choice of seating. Furthermore this unit has minimal flexibility for modi-

Con timed on page 2

tying frequency and gain characteristics to meet listener's needs.

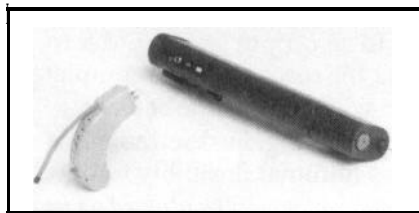
INDUCTION LOOP SYSTEM:

The induction loop system uses a wire loop encircling a room to broadcast an electromagnetic signal to a receiver worn by the listener via a neckloop or through the telephone coil of a personal hearing aid. By transmitting the signal electromagnetically, no hard wire connections to the audio source is needed. Furthermore, the induction loop unit is available in a portable or permanent unit which allows it to adapt to many situations, e.g. group meetings at work and individual needs at home.

The limitation of this system is that it appears to be inherently noisy due to interference from other sources of electromagnetic energy, e.g. electric dimmers or computers. In addition, the frequency response produced by the hearing aid often is altered when using the telephone coil circuitry possibly causing undesirable amplification levels. Another limitation is that the output from one encircled loop could spill over to adjacent loops, causing interference with amplified speech. For this reason, only one loop system can be used within the desired area.

FREQUENCY MODULATION RADIO SYSTEM

Today's Frequency Modulation (FM) Radio system is possibly the most popular and versatile assistive listening device. This device, similar to radio stations, takes the speech signal from the microphone and converts the stimuli to frequency encoded radio waves. The radio waves are then broadcast. A receiver, tuned to the same frequency, is worn by the listener which decodes the signal and converts it to an electrical signal. The



electrical signal is delivered via an earphone or a personal hearing aid.

Because of the deregulation of only classroom usage of the FM system in the early 1980s, this system is widely used in various situations. Furthermore, the advancement in miniaturization of electrical components allowed the development of a Behind-the-Ear (BTE) hearing aid/FM unit. The portable flexibility of this EM. unit has proven effective while listening to T.V., radio, conversing in an automobile, participating in lectures, conferences, business meetings, family gatherings, and leisure activities.

INFRARED SYSTEM:

The infrared system consists of an infrared light emitter which transmits the speech signal from the microphone to the listener's infrared receiver. A straight visible line between the transmitter and receiver



is essential for high sound quality. *Because infrared beams have similar characteristics as light rays, the chance of signal distortion due to exposure to similar

rays from objects that project light or sunlight are extremely high.

However, this technology is generally ideal for confined indoor listening areas such as a television room or small meeting areas.

OTHER SYSTEMS:

A telephone amplifier and speaker telephone are other kinds of listening systems. Because there are a variety of listening systems, one must evaluate their needs carefully in determining the most appropriate system(s).

A hearing impaired individual could employ an awareness system to assist them in their every day situations. This device signals the impaired listener of various occurring sound stimuli (e.g. telephone or doorbell ring, smoke alarm, baby crying, clock alarm, pagers) by other than

acoustical means. By making these stimuli more apparent, either visually or tactually, one's quality of life can be greatly enhanced. A brief discussion of the different types of awareness systems are below:

- TTY: A telecommunication device is used by individuals who cannot hear or cannot speak on the telephone. By using a keypad terminal a person can type and read a conversation.
- Alerting devices: These devices react to a sound or signal and inform the individual by way of a flashing light, activating a vibrating unit, or making a loud sound. Night time is often a time of concern for hearing impaired individuals because their hearing aids are removed during sleeping.
- Television decoders: This device is designed to encode the dialogue and sound effects of most programs or videos into a text form that can be read on the screen, like subtitles in foreign films. A VCR, cable box, laser disc player, or satellite turner must be used with these decoders.

SUMMARY:

A hearing impaired listener wearing a hearing aid may find difficulty interacting in every day listening situations. By utilizing various ALDs, with or without hearing aids, to assist in one's listening needs - understanding the desired message or aware of an acoustic occurrence, the quality of one's life will be greatly improved. Although there are many types of ALD systems a hearing impaired person should be evaluated by their hearing health care professional to determine which system(s) would deliver maximum satisfaction for their needs.

May is Better Hearing and Speech Month