

Again, it is the relationship of the PV to the other immittance values that determines its significance. PV is irrelevant in the presence of normal TM compliance and normal MEP but significant when MEP and TM compliance are abnormal. It is critical for you to understand how your particular piece of equipment (immittance bridge) obtains and displays data (results).

When it is necessary to communicate screening results to parents or physicians either verbally or in writing keep in mind that immittance screening does not allow a medical diagnosis to be made – that is done by the physician. Appropriate phrases include: “Immittance measurements suggest....”; “Results are consistent with...”; “...support the presence of...”

THE AUDIOGRAM

This section is included to help you interpret audiograms and reports you receive from other facilities. A basic knowledge of the audiogram should facilitate your communication with audiologists and with families and teachers.

An audiogram is a graphic representation of a person’s hearing at a specific point in time. For children with conductive hearing loss, audiograms can be different from one evaluation to the next due to fluctuations in hearing. As you use the IEP/IFSP process to plan for children you should have current audiological information. For infants with sensorineural hearing loss hearing should be evaluated every 3-4 months for the first year after identification, at least twice a year through the preschool years and, at a minimum, annually after entering school. The purpose of close audiological monitoring is to identify progressive hearing loss.

In the past young children were tested in sound field. The child sat on a parent’s lap inside a sound proof booth with a speaker on either side. As stimuli were presented via the speakers and the child turned toward the signal she/he was reinforced with a blinking light. The technique, called Visual Reinforcement Audiometry (VRA) does not provide ear specific information; it only tests the better ear if in fact there is a difference. If you are referring a child because they failed the OAE component of the hearing screening **you should expect and request ear specific information from the audiological assessment.**

Audiological assessment for children below 3 years (developmentally) of age is likely to include sedated Auditory Brainstem Response (ABR) as a means to establish ear specific information. If you are referring a child in this age group for audiological assessment assist the family in finding an audiologist with the appropriate equipment and skills. See Appendix H for a description of minimum audiometric diagnostic criteria for infants birth to six months of age.

When a child is developmentally about 3 years of age Conditioned Play Audiometry (described previously in this manual) is an appropriate technique to evaluate children. Air conduction and bone conduction thresholds can be obtained using this approach.

The numbers at the top of any audiogram represent pitches or frequencies (Hertz; abbreviated Hz). A single frequency tone is known as a pure tone. Two hundred fifty Hertz (250 Hz) is a low frequency tone approximating middle C on the piano. Each darkened line thereafter is about one octave higher in pitch (500 Hz, 1000 Hz, 2000 Hz, etc.). The area between 300 Hz and 4000 Hz represents the frequencies where most human speech sounds occur. Vowel sounds are primarily low frequency information and consonant sounds are primarily found in the higher frequency range. It is the low frequency information that helps you **hear** speech but it is the high frequency information that helps you **understand** speech. This explains why individuals with a high frequency hearing loss may misarticulate consonant sounds or may have difficulty discriminating words such as 'tin' and 'pin'.

The numbers down the side of the graph represent loudness, as measured in decibels (dB); the smaller the number, the softer the sound. The level of normal conversational speech is approximately 50 dB.

Threshold testing involves finding the softest level at which and individual can hear each of the pure tones shown on the audiogram. Air conduction thresholds are represented by Os for the right ear and Xs for the left ear, and are obtained by presenting pure tones via earphones. These thresholds are an individual's response to sound as the sound travels through the entire auditory mechanism (outer, middle, and inner ear).

Bone conduction thresholds are obtained by placing a bone conduction vibrator on the mastoid. If these thresholds are better than those obtained by air conduction, the individual is said to have a conductive hearing loss. In other words, when the middle ear is bypassed, the person demonstrates better hearing. If air

conduction thresholds identify a hearing loss and the bone conduction thresholds are the same as those obtained by air conduction, the hearing loss is sensorineural.

Previously, degree of hearing loss was categorized as follows: normal, 0-15; minimal, 16-25; mild, 26-40 dB; moderate, 41-55 dB; moderately severe, 56-70dB; severe, 70-90 dB; and profound, 90+ dB. So, what does it mean if a report says the child has a moderate hearing loss? It simply means that if you take a brief look at the audiogram and most of the thresholds are between 41 and 55 dB the hearing loss is described as moderate. Regardless of how imperfect this classification system might be it is still commonly used.

Because research has shown thresholds of 15 dB are necessary to adequately hear and acquire speech and language the term “educationally significant” is now used to describe milder degrees of hearing loss. The audiological criteria for educationally significant hearing loss can be any of the following:

- 1) An average pure tone hearing loss in the speech range (500-2000 Hz) of at least 20 dB in the better ear.
- 2) An average high frequency pure tone hearing loss of at least 35 dB in the better ear for two or more of the following frequencies: 2000, 4000, or 6000 Hz.
- 3) A permanent unilateral hearing loss of 35 dB or greater.

The audiogram in Figure 6 is referred to as the **Familiar Sounds Audiogram** and it identifies environmental sounds and speech sounds at the approximate loudness and pitch at which they normally occur. It may be helpful to you (and the teachers and families you work with) to transfer the threshold information from an audiologist’s audiogram onto the Familiar Sounds Audiogram. By doing so you have a visual representation of what the child can and cannot hear. Environmental and speech sounds appearing above the thresholds are too soft to be heard (inaudible) and sounds appearing below the thresholds are loud enough to be heard (audible).

Most audiograms include a Pure Tone Average (PTA), a Speech Reception Threshold (SRT), Speech Discrimination Scores (SDS) and test reliability indication. This information is related to the pure tone thresholds and will assist you in understanding audiological reports.

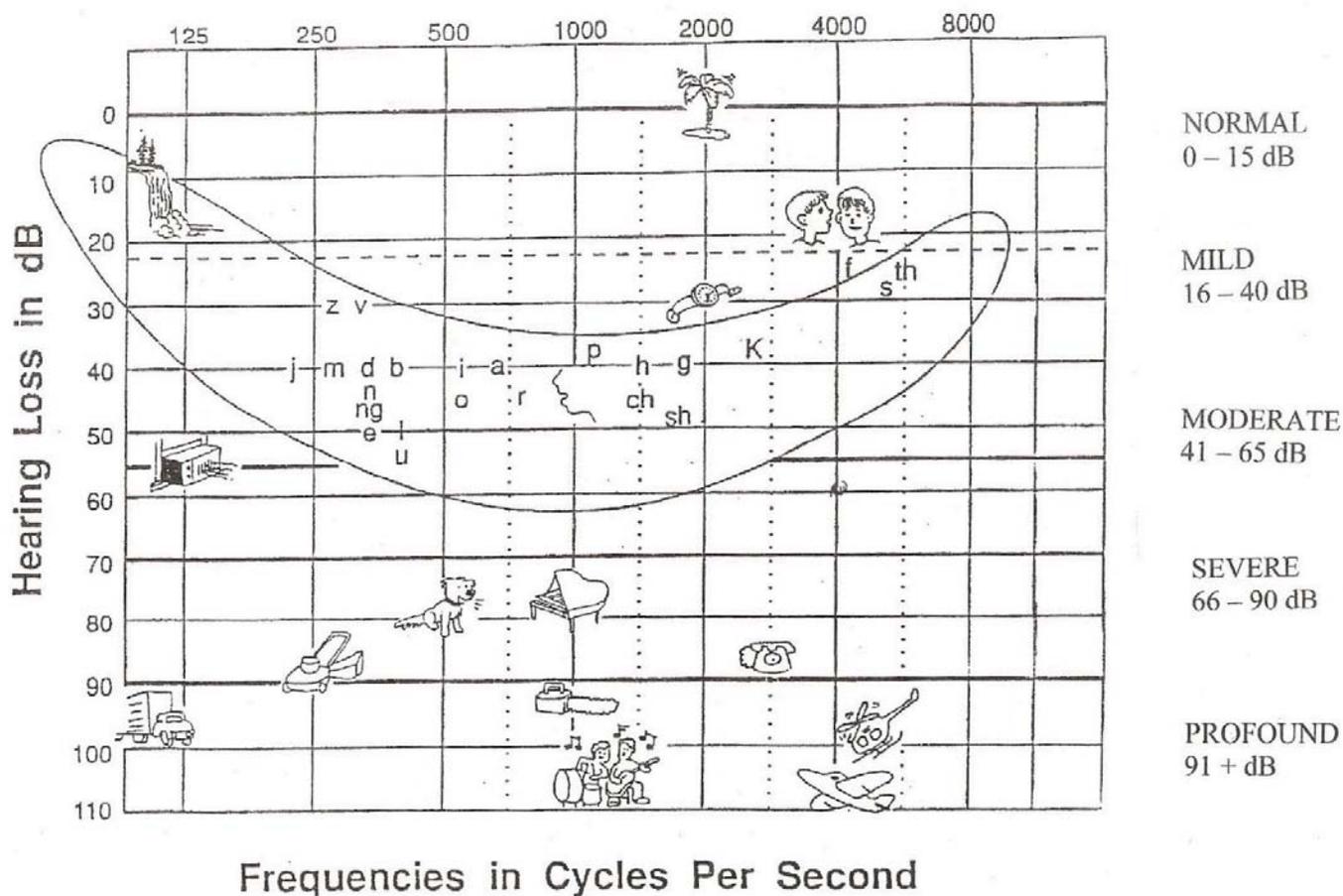


Fig. 6 Familiar Sounds Audiogram
Comparison of the Frequency and Intensity of
Various Environment and Speech Sounds

Pure tone average (PTA) is computed by averaging the thresholds in each ear at 500, 1000, and 2000 Hz or in the case of a high frequency hearing loss, 500 and 1000 Hz may be used. Example: If the thresholds at 500, 1000, and 2000 Hz are 40, 40, and 50, respectively, the PTA is 43 ($40+40+50=130/3=43$). A phrase such as "Johnny has a 40-45 dB hearing loss" is derived from the PTA.

A Speech Reception Threshold (SRT) is the softest level an individual can identify 50% of the two syllable words presented. Older children simply repeat words such as 'cowboy,' 'hot dog,' 'airplane,' and younger children may point to pictures. An individual's ability to hear this type of word (known as a spondee) is directly related to their thresholds in the lower-to-middle frequencies (500-2000 Hz).

NOTES
