Pure tone threshold investigations

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IV. STUDIES OF HEARING AND DEAFNESS

A. PURE TONE THRESHOLD INVESTIGATIONS

Investigation on the frequency of deviations from the mean threshold of hearing occurring in a large group of radio engineering and technical personnel.

When the threshold of hearing in a large group of subjects is measured, it is found that the greatest part of the individual threshold values fall within a relatively limited intensity range of about 10-15 dB provided that only the low and middle frequency range up to about 3000 c/s is considered. But occasionally clear deviations of 15-25 dB may appear in this range although no particular cause to account for them can be found in the case history. Not infrequently the subject in question is totally unaware of the deviation. A thorough investigation of such deviations and dips in the threshold curve would, in general, be only of minor significance for clinical purposes. It now appeared, however, that, in parents whose children suffered from congenital hearing defects or deafness and who are usually known to be normal themselves with respect to hearing, more or less pronounced deviations from the mean threshold of hearing occurred more often and could, to a certain extent, be taken as a clinical characteristic of this particular group. This fact therefore made it desirable to obtain more data concerning such deviations from the threshold of hearing as are representative of an average population.

A group of about 170 male subjects, all the technicians and engineers of a radio cooperation, was analyzed by means of Békésy-audiograms with respect to their threshold deviations in the low and middle frequency range. The results indicate that, in subjects between 20-40 years of age, about 5-12 % with a marked tendency towards a higher percentage with increasing age present deviations from the mean threshold of hearing or a hearing loss respectively (without any particular cause in the case history) that extend over a bandwidth of at least one octave with a hearing loss of at least 15 dB at the maximum and 6-8 dB at the borders of this frequency range relatively to the mean threshold of hearing.

To ascertain whether similar conditions hold also for an average female group a sample of male and female patients with slight neural hearing disorders was used as no large group was at hand. The investigation
of this sample showed that, with certain restrictions, the different types of hearing loss such as low-frequency deafness, flat-loss, and various large dips in the threshold curve appear as frequently in male as in female groups, which suggests that deviations from the threshold of hearing in the above sense occur roughly as often in male as in female populations consisting of subjects 20-40 years of age.

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B. SPEECH COMPRESSION TECHNIQUES APPLIED TO AIDS FOR THE HARD OF HEARING

(1) Hearing aids

a. Transposer amplifier

Further development has been carried out on the speech compression hearing aid based on transposing the high-frequency consonant spectrum area to frequencies below 1500 c/s. This device and results from preliminary testing were reported on at the 3rd International Congress on Acoustics in Stuttgart 1959. (1)(2)

The recent work has been concerned with technical variations of the transposition scheme and with a tracking program involving pre-school children 3.5 to 6 years of age. The training program includes the learning of voiceless consonants in isolation and also complete words and short sentences.

b. Frequency division

A compression scheme based on frequency division has been taken