

ing the same note sounded at two different intensities will say the sound is three times as loud as the first, another that it is twice as loud, whereas measurement shows it to be but half as loud again. When to this human aural disability is added the effect of the decreasing sensitivity of the ear to increasing sound vibrations, it becomes harder than ever to say definitely that a certain note is equal in intensity to a note an octave lower. Further reference will be made to this in my second section.

In marking all the frequencies except that of middle C on my coupon as fading, it must not, therefore, be assumed that I considered this fading was in any way excessive until near the limit of the frequency range of my speaker. To be absolutely faithful to my impressions, however, and to avoid exaggeration contributed to by pride of ownership of a certain speaker, I have, as stated above, confessed to a fading right from middle C. The word "fading" really needs qualification according to degree, and with this in view I have placed my crosses in the form of a curve which will give an approximate idea of this degree.

A POINT that surprised me—using a horn type speaker—was that the fading increased at a quicker rate above middle C than below it, vibration 2048 (3rd octave above middle C) being appreciably less in intensity than frequency 32 (3rd octave below middle C). In other words, although not having in an exponential horn, my speaker appears to deal better with low notes than with high ones. This is, I believe, contrary to the accepted theory governing the performance of horn speakers.

TO come now to the second section of my report. Assuming the result obtained from my speaker to be equivalent to the average—a fair assumption I think, as it is a speaker with a good reputation—many people may have been disappointed with their results. Before taking such drastic action as throwing them into the dustbin, however, it is as well to consider one or two aspects of the case which may not occur readily to the mind. One of these I touched on in my first section—the question of the sensitivity of the human ear. It was stated in the "Radio Record" that all the notes put out were of the same volume. Whether this means that the same power was used to produce them, or that the intensity of the produced notes, measured on recording instruments would have been the same, I do not know. Even in the latter case, however, I do not find cause to condemn a speaker because it will not produce a frequency of 4000 as loudly (apparently) as it will produce a frequency of 256. While this failing may be, and undoubtedly is, present in loudspeakers, I think some of the apparent lessening in intensity is due to the merciful natural law which decrees that our ears shall not respond so easily to extremes in sound frequencies. Imagine frequency 4000 sounding as loudly in the ears as does frequency 256. It would be comparable to standing beside a railway engine blowing off steam at high pressure through a whistle—little short of deafening.

I THINK, then, that in judging a speaker, one should endeavour to forget that a certain high or low-frequency note sounds less in intensity than a

middle frequency note, and try to judge the result impinged on the ear, by comparison with the actual sound, as remembered, of the instrument being broadcast. I think if the highest note on the violin were produced with as much intensity, recorded on a sound-measuring instrument, as, say, middle C or the first C above middle C, it would still be said in a concert hall that "it didn't sound so loud." Make allowance, therefore, for this human failing, if you care to call it that, though I think it would be more correctly described as a protective adjustment of nature.

Lest I should be deemed to have fallen into the manner of one who advances proved theories, let me here reiterate that all I have said in this question is a matter of opinion only on my part, and quite open to correction.

ON speakers themselves. The sound is produced roughly in the same fashion as it is received by the ear—by vibration of a diaphragm. Until something revolutionary occurs in speaker design, therefore, it is hardly

fair to blame them for having the same tendency as the ear, i.e., to quieten high notes, especially when one makes allowance, as one must, for the fact that mechanical disabilities cannot fail to add even more to this tendency, to the detriment of the speaker compared with the ear.

Moving-coil speakers are reputed to give the most natural reproduction. Even these fall short of perfection. They are also very costly. A cone or horn speaker at an average cost can, therefore, be expected to have failings. In view of all these points, and in spite of the fact that technically, my speaker reproduction may have been shown to be a dismal failure, I shall continue for the present to use it, satisfied that at to-day's stage of speaker development at a reasonable price I am obtaining as nearly perfect reception as possible.

OF the transmission itself I have little to say. The generator hum was rather in evidence on my speaker, and possibly this may have overpowered one or two of the lower high frequencies I failed to hear. Again

I will give my speaker the benefit of the doubt. It may be relevant here to say that perfect speaker reproduction can, of course, only be attained hand in hand with perfect transmission, and as the latter is admittedly not achieved yet, here is a further small argument in favour of the retention for the time being of the not-perfect speakers we already may possess.

THE following point I mention in view of the fact that repetition of this test is possible from other stations. After one or two of the very lowest frequencies had been sounded, mention was again made of the possibility of hearing the harmonic an octave higher, and mistaking it for the fundamental. Then the frequency an octave higher was sounded. In one case it seemed to me that the lowest frequency was a border-line case, that is, I could not be quite sure if I heard the fundamental and harmonics, or the harmonics only. Memory slightly faded during the musical director's remarks.

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