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FINDING A REALISTIC EAD

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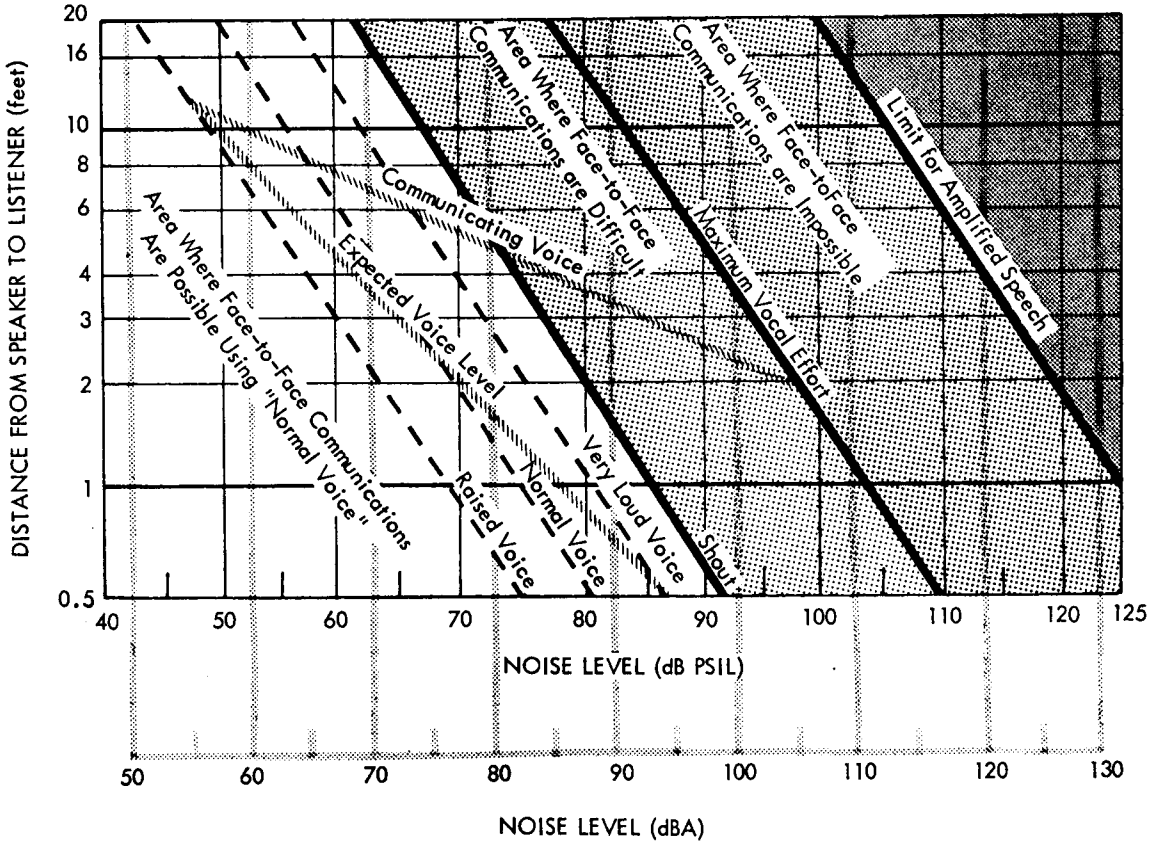

In the August 1969 issue of SOUND AND VIBRATION Magazine, Pages 22-26, there appeared an excellent article by Mr. John C. Webster, Naval Electronics Laboratory, entitled "SIL — Past, Present and Future".

The nomograph in the article (reproduced here) provides an ideal reference for establishing a very realistic EAD limit for normal to very loud talkers in varying noise environments.

For our purposes, we normally take a series of 1/3 octave readings at 500, 630, 800 and 1000 Hz, and, taking the highest reading within that range, add 4.9 dB to it and find that level on the dB PSIL scale. Since most of the sound level meters in use by CE contractors have a 4000 Hz octave band filter in place of the "A" scale, it is not possible to take a dBA reading directly. If you use the dBB scale (fast) and subtract 8 dB, you will arrive at a reading sufficiently accurate to allow you to apply it to the dBA scale on this nomograph.

It can quickly be seen from the nomograph that no EAD should ever exceed 20' and very rarely 10'. And of course, EAD should be less than D_c (EAD $< D_c$).

To interpret the figure, note that to converse in a normal voice at 6 feet a PSIL of about 53 dB or an A-weighted level of 60 dBA could be tolerated. (This corresponds to an old SIL of 50 dB.) Above this noise level a normal voice level would never be expected of normal-hearing people; they would raise their voice level according to the "expected voice level" line.

As another example, let us say we wish to know how noisy a space can be to allow people to converse at 3 feet. An extension of the 3-foot distance line to the "expected voice level" line dictates an upper noise level limit of about 65 dB PSIL or 72 dBA.

In general, this "human engineering nomograph" can be used only if the same noise surrounds both the talker and the listener. However, let us say that an 80-dB PSIL noise surrounds only the talker. At this level his vocal effort would be expected to be between "raised" and "very loud," and as such he could be heard by a listener in the same noise, 80 dB PSIL, at 1 foot, but by a listener in 70 dB PSIL at over 2 feet, or at 6 feet if the listener were in 60 dB PSIL of noise.

Voice level and distance between talker and listener for satisfactory face-to-face speech communications is limited by ambient noise level. Along the abscissa are two generally equivalent objective measures of noise level: the average octave-band level in the octaves centered at 500, 1000, and 2000 Hz, called the three-band preferred octave speech-interference level (PSIL), and the A-weighted sound level meter reading (dBA).

An example for interpreting the chart: Jet aircraft cabin noise is roughly 80 ±2 dBA. At 80 dBA in their expected (raised) voice level, seatmates can converse at 2 feet and by moving a little, can lower their voices to normal level and converse at one foot. To ask the stewardess for an extra cup of coffee from the window seat (four feet), one would need to use his communicating (very loud) voice.