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NOISE AND LOUDNESS EVALUATION

LOUDNESS OF IMPULSE NOISE WITH PARTICULAR REFERENCE TO SONIC BOOM

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Research has been carried out into the absolute loudness level of sonic-boom, using a pressure-tight booth to provide whole body immersion. The pressure booth was developed to enable rise times of down to 2 ms to be produced with a good low frequency response. Overpressures of up to 2 psf can be produced and the range of pressures used during subjective experimentation was 0.5 psf (121.6 dB peak) to 2.0 psf (133.6 dB peak). Rise times varied from 2 ms to 16 ms, and, in all, experiments were carried out with ten conditions of rise time and overpressure combinations.

For experimental method the method of adjustment was utilised, and the subjects comparison stimulus consisted of a pure tone burst of 20 ms duration and a frequency of 200 Hz. Experiments were carried out with other comparison stimuli and these comprised a pure tone of frequency 200 Hz and 500 ms duration; a pure tone burst of frequency 400 Hz and 20 ms duration and a pure tone of 320 ms duration at a frequency of 400 Hz. Significant underestimation of loudness level was found when using a 'continuous' pure tone as the comparison stimulus.

The pitch of the standard and comparison stimulus has an effect upon the accuracy of subjective experimentation, and consequently the characteristic pitch of the standard stimulus (i.e., a half N-wave) was determined subjectively and correlated with the weighted energy density. Subjective variance is shown to progressively decrease as the ratio of the pitch of the standard and comparison stimuli approach unity.

Since the duration of the standard and comparison stimuli should be closely matched to provide optimum experimental conditions, preliminary experiments were carried out to determine the subjective duration of the half N-wave in various conditions, and these values used for the duration of the comparison stimulus.

Absolute loudness level of the half N-waves were obtained by comparison of the 20 ms comparison stimulus with a 500 ms 'continuous' pure tone, in a temporal integration experiment, and the equivalent continuous tone pressure levels converted to loudness levels by use of the quadratics in the Normal Equal Loudness Contours (BS 3383: 1961).

Comparison is made between the results of the subjective experiments and those loudness level calculated results based upon

the method of Johnson and Robinson, and the method of Zepler.

The effect of the low frequency content in the stimulus spectrum upon loudness level is examined and within the range of loudness levels used (81.5 phons to 104 phons) is shown to be non-significant below 50 Hz.

Some effects of noise on memory and attention

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Working in loud noise (in excess of 90dB(A)) is stressful, particularly when the task being performed is a demanding one. In order to maintain high levels of efficiency under stressful conditions, one strategy that may be adopted is to attend selectively to those aspects of the task situation that are considered important and to those task events which are considered most likely to occur. In this way the task situation is made less demanding. Recent evidence concerning the effects of noise on tasks involving memory and attention is reviewed and a comparison is made between the effects of noise and other stresses which seem to have similar effects. Some experiments are also described.