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THE LIMITATIONS OF PHYSICAL NOISE CRITERIA

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1. The basis for the introduction of most noise criteria is that the rating scale from which they are derived has been found to correlate with some measure of subjective response to noise. However, when they are applied, noise criteria have to work in the opposite direction; that is, they are called upon to predict what the likely effect of a given acoustic situation will be on the individuals exposed to it.

The effectiveness of a noise criterion therefore depends on how well it reflects or embodies the key elements of the situation to which it is being applied; that is, those characteristics of the acoustic environment which will determine the way in which they people concerned will respond to it.

2. It is the author's view that, in the majority of acoustic environments, subjective response is governed not by the overall physical characteristics of the noise to which people are exposed but by the nature of the sources which are present, their relative level, and the relationship between the receiver and the sources.

There are there phenomena in particular which the development noise criteria has to take into account.

1. Differences between sources

Some noise sources are inherently more annoying than others so that different sources heard at the same level by the same people in the same situation will cause different amounts of annoyance. For this reason, sound level meters and energy dose meters are poor models of human response to noise.

11. Differences between situations

The same source heard at the same level by the same people but in different situations will cause different levels of annoyance depending, for example, on whether it is masked by other sources or not.

111. Differences between people

The same source heard at the same level in the same situation by different individuals will produce different reactions depending on the relationship between the source and receiver. This is clearly demonstrated in the case of speech since the information content of the speech and the social relationship between the person talking and the receiver are very much more important than the level of the speech.

3. The prediction of noise nuisance in a particular situation therefore requires, in addition to the statistical, energy and frequency characteristics of the

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noise, knowledge of what sources are present, their relative levels and their meaning to the receiver.

Noise criteria are therefore most successful in closely defined situations or when there is a clear offending source, such as aircraft, standing out above an otherwise neutral or 'wanted' background. They are least successful when used to prescribe maximum noise levels of one sources in a multi-source environment, where the risk is always that the source being controlled is either not the most disturbing or is performing a useful masking role. In such cases, the insensitive application of physical noise criteria can make a situation worse rather than improve it.