Proceedings of The Institute of Acoustics

THE BACKGROUND AND USES OF "A GUIDE TO THE MEASUREMENT AND PREDICTION OF THE EQUIVALENT CONTINUOUS SOUND LEVEL, L_{eq}".

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Introduction

The present authors were closely involved with the preparation of the recently published Guide[1] and this paper is presented on behalf of the Noise Advisory Council, in whose name the Guide was published. The purpose of the paper is threefold - firstly to explain why and how the Guide was produced, secondly to outline the contents of the Guide and finally to discuss the potential uses of the Guide.

Background to the Guide

The Guide has its origins in the report by the Noise Advisory Council[2] (NAC) in which it was recommended that the multiplicity of noise immission measures used in the United Kingdom be replaced by a single measure of environmental noise, the Equivalent Continuous Sound Level, L_{eq}.

The Department of the Environment (DOE) issued a Note as a Supplement to the Council's report[2] referring to the uses of L_{eq} made in this country at that time and to problems envisaged in extending its use. In particular it was pointed out that further transition to L_{eq} would be assisted by the preparation of a reference work on methods of measurement and prediction. Accordingly a Working Party of specialists was set up for the purpose.

The Working Party set out to advise on the measurement and prediction of L_{eq} from all the major sources of environmental noise. The aim of the Guide was seen as a consolidation of available, but diffused, information and techniques into a single publication, suitable for use by a technically qualified but acoustically non-expert readership. The Guide was not to concern itself with the merits or otherwise of L_{eq} as a measure of environmental noise since that ground had been covered in the earlier NAC report. Also it was felt that the Guide should not deal with the definition of acceptable levels of noise since this was a matter for regulations. On this basis individual contributions were prepared by the specialists in their particular fields, for compilation and editing by the present authors.

Content of the Guide

The Guide consists of four main parts. Firstly there is a review of the important concepts and definitions involved in the use of L_{eq} and, in particular, the concept of L_{AX}, the single event noise exposure level, is presented. Then instrumentation and techniques of measurement are described. The prediction of noise from road traffic, aircraft, railways and fixed sources (eg industrial sites) is then described. Guidance is given on technique and overall approach, including the identification of the necessary input data. The amount of detail, both in relation to prediction methods and

source data, varies between the four different sources of noise discussed, reflecting differences in the state of the art. Finally advice is given on the translation between noise measures in current use and L_{eq}.

Uses of the Guide

The Guide is not intended as a replacement for procedures specified in existing regulations eg those relating to noise abatement zones[3]. Rather it is a more general document for use in dealing with noise problems, both where regulations exist already and where they are still awaited.

The Guide serves to clarify the purely technical aspects of noise measurement and prediction and, by emphasising general principles, it provides a firm basis for the solution of a variety of problems. Two examples of the way in which the Guide can be applied to good effect can be seen in recent studies at NPL. In the first, an assessment had to be made of the magnitude of aircraft engine thrust reversal noise relative to the total noise of aircraft operations[4]. The question had arisen as to whether the introduction of noise level limitation to the reverse thrust phase of landing operations would effect a significant improvement in the overall noise environment around airports. The single event noise exposure level, L_{AX}, was used to quantify the contribution of individual sources to the total noise expressed by L_{eq}. By this means the circumstances were demonstrated in which the reduction of reverse thrust noise could be expected to have a significant effect. In the second study, still in progress, a procedure for sampling the noise environment round a hoverport is being developed which will permit predictions of noise contours based on limited measurements and propagation calculations. Other applications in which L_{AX} might readily be used to quantify the noise of single events in relation to L_{eq} for the total noise are assessment of the present and future noise impact of light aircraft operations from general aviation airfields and of the introduction of helicopter traffic.

The Guide deals briefly with the numerical relationships between L_{eq} and the various measures of environmental noise currently in "official" use. For example the close correlation found between NNI and L_{eq} is shown in Figure 1. The information in this chapter could be used to assess, in an overall sense, the implications of expressing, in terms of L_{eq}, local authority planning and development guidelines for areas affected by noise.

Conclusions

It will be clear that if any code of practice in this area was to be comprehensive, with respect to the sources of noise covered and to the required measurement data to describe the sources, it would have to run into several volumes and to be continuously up-dated. Methods of measurement and prediction of environmental noise are subject to continual research and improvement. As it is already, in a number of respects, technical developments have run ahead of the Guide. Thus the section on measurement makes no reference to the instruments now available which give a direct reading of L_{AX}. Furthermore there have been considerable recent developments in the state of knowledge on propagation[5] which are of relevance to noise prediction from all sources. Amended and expanded editions of the Guide will have to be borne in mind for

the future. In any case, where regulations are concerned, more detailed prescriptions will always be necessary if the correct procedures are to be followed. Nevertheless the hope is that in setting down general principles now the Guide will help to accelerate the process of rationalisation in the rating of environmental noise.

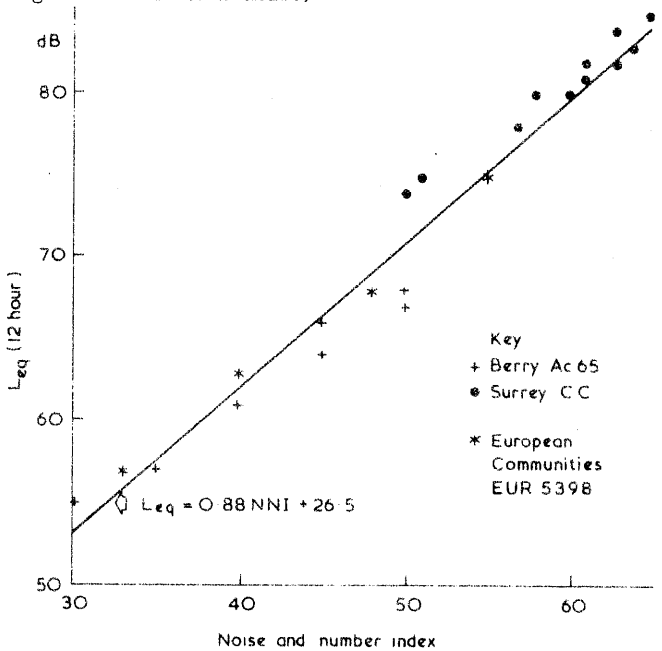

Fig 1. L_{eq} (12-hour daytime) and NNI

References

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(2) Noise Advisory Council. 1975. Noise Units. London. HMSO.

(3) Statutory Instrument 1976. No 37. Public Health, England and Wales. The Control of Noise (Measurement and Registers) Regulations 1976. London. HMSO.

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