Proceedings of The Institute of Acoustics

ROAD TRAFFIC NOISE; L_{10} vs L_{eq}

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Summary

During routine measurements of road traffic noise necessitated by the implementation of the Noise Insulation Regulations 1975 the opportunity to record noise levels in terms of more than one index has been taken. This paper presents a comparison of simultaneously obtained values of L_{10} and Leq, with the conclusion that while a suggested relationship between the values of the two indicies, i.e. Leq = L_{10} - 3, may be a useful 'rule - of-thumb' for environmental planning purposes, it lacks the precision required for the application of legislation.

Introduction

For some time now it has been considered desirable to quantify the more or less continuous but fluctuating sound which emanates from road traffic by means of a single number descriptor. Over the last twenty years much work has been directed towards the evolution of such a descriptor which reflects the subjective response of people and at the same time lends itself to relatively simple methods of measurement and prediction.

By the early 1970's, the L_{10} (18 hour) index, i.e. the arithmetic average of the noise level just exceeded for 10% of each hour between 06.00 and 24.00, had surfaced. Though its adoption in Government circulars and legislation (1, 3, 5, 8, 9) relating to road traffic noise, it received the 'official seal of approval' and has subsequently been utilised extensively in the UK.

The attraction of a common noise index capable of describing in numerical terms people's response to noise whatever its source(s) has been recognised for some years. The Noise Advisory Council recommended (6), with some reservations, that the equivalent continuous sound level, Leq, could be considered as a candidate for such a unified noise index, with the suggestion of a gradual transition to the use of Leq for quantification of a noise environment.

The Council subsequently issued a guide to methods of prediction and measurement of Leq (7) which includes comments on the measurement and prediction of road traffic noise in terms of Leq. Of particular interest was a suggestion that 'for the majority of situations of practical interest a value of Leq over a specified period of time may be derived from a value of L_{10} measured directly over the same period by the numerical subtraction of 3dB'.

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Since facilities were readily available to the author for results of traffic noise measurements, required for traffic noise assessments under the Noise Insulation Regulations, to be obtained in terms of both L_{10} and Leq, it has become a matter of routine to record the value of both indicies. This paper will present the results in graphical form.

Measurements

All measurements were carried out one metre outside a building facade between the hours of 06.00 and 24.00 on a normal weekday, following the methodology (2) specified by the Noise Insulation Regulations. A measurement period of 15 minutes was utilised throughout.

Instrumentation comprised 162E Environmental Noise Analysers by Computer Engineering Limited coupled with General Radio precision 25mm electret microphones. This system was programmed to yield a continuously integrated Leq value with a simultaneous evaluation of L_{10}.

Results and Conclusion

The outcome of the measurements will be presented in graphical form as a plot of L_{10} against Leq for each measurement position investigated.

Full details will be available in a Greater Manchester Council Acoustic Report (4) from which it will be seen that there is no simple relationship between L_{10} and Leq of sufficient precision to allow a ready transition from L_{10} to Leq by amendment of existing traffic noise legislation.

References

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5. Noise Advisory Council, 1973 Department of the Environment. A guide to Noise Units.

6. Noise Advisory Council, 1975 HMSO. Noise Units.

7. Noise Advisory Council, 1978 HMSO. A guide to the measurement and prediction of the equivalent continuous sound level, Leq.

8. Statutory Instrument 1973 No. 1363. The Noise Insulation Regulations 1973.

9. Statutory Instrument 1975 No. 1763. The Noise Insulation Regulations 1975.

The views expressed in this paper are those of the author and not necessarily those of his employer.