

THE USES AND ABUSES OF L_{90}

John Seller

Tottenham Acoustical Group

All Saints, White Hart Lane, London

1. Introduction

Background Level - The main use of L_{A90} T is in the determination of the background noise level.

Fast / Slow - Slow can seriously overestimate the background level.

Abuses - A major abuse of L_{A90} T is its use in setting a boundary noise condition.

Other uses - There are other uses for L_{90} for instance in planning.

2. Background Level

The background level is that level which exists for the majority of the time (90%). In planning or in rating, the background level should be determined in the absence of the specific noise source (the noise to be rated).

However there are circumstances when concurrent determination of a background level and specific noise is appropriate. Obviously the specific noise has to be a non continuous source. I have applied this to Clay Pigeon Shooting and Piling.

For instance

Shooting background level - is the background level whilst shooting is occurring. The shooting background level which is very similar in value to but fractionally higher than the "true" background level. It is my opinion that the concurrent shooting background level gives a more representative value than measuring an actual background level when determined just prior to or following a shoot. Since those background levels are often atypical due to increased traffic flow to and from the site and/or there has been a change in wind speed or direction during the intervening time. Further when dealing with a large site with five or more monitoring positions spread over a number of miles which of the points might be used to determine a "background level" for all the positions.

3. Slow / Fast time weighting

Two tape recordings were made; (1) Of a impulsive noise. (2) Of aircraft takeoff.

Figure 1 shows that the slow and fast time constants gives considerably different results. The slow time constant does not permit the true assessment of the background level. The use of a slow time constant tends to give a measure of L_{50} .

Figure 2 shows a trace of successive aircraft takeoffs from Heathrow Airport. There is more smoothing with the slow time constant and the L_{A90} 's would not be significantly different because of the slower rate of change of noise level.

In determining statistical parameters the following should be observed:-

- regular sampling
- small class intervals
- fast sampling rate
- fast time constant

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Figure 1b Impulsive Noise Slow time weighting

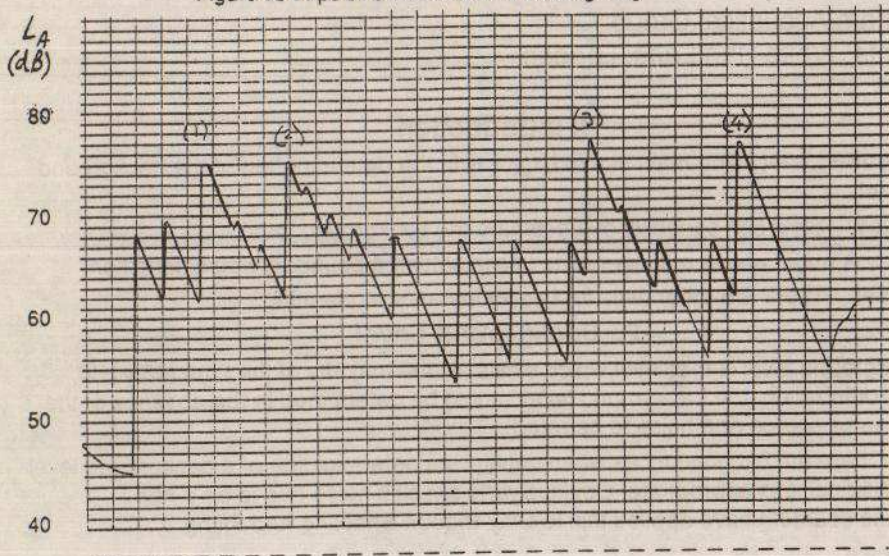


Figure 1a Impulsive Noise Fast time weighting

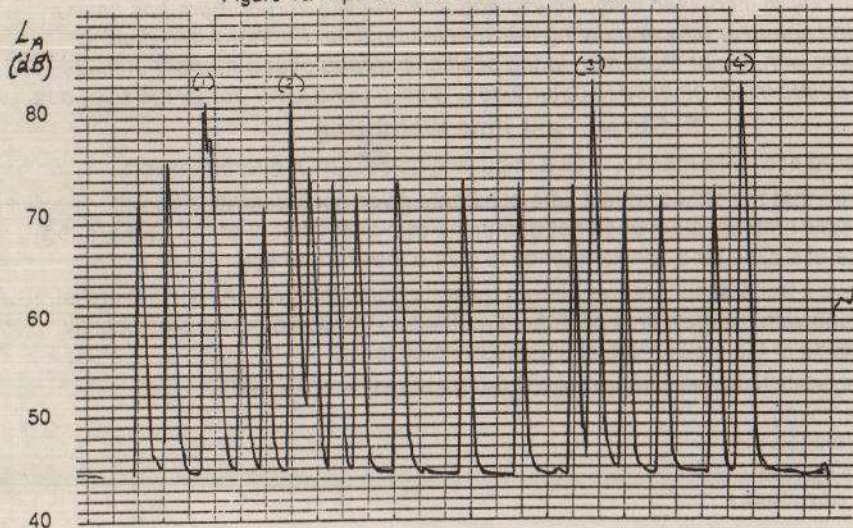


Figure 1

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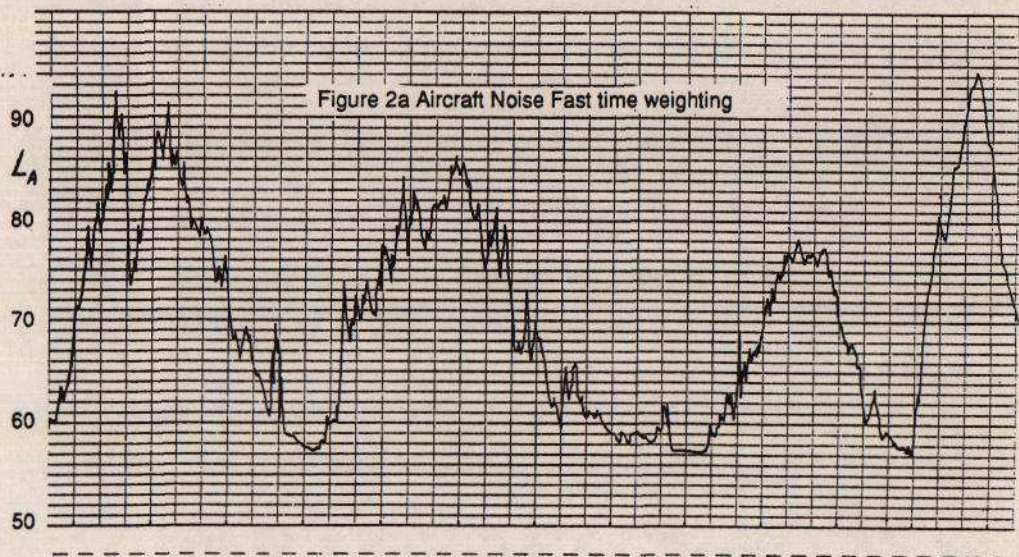
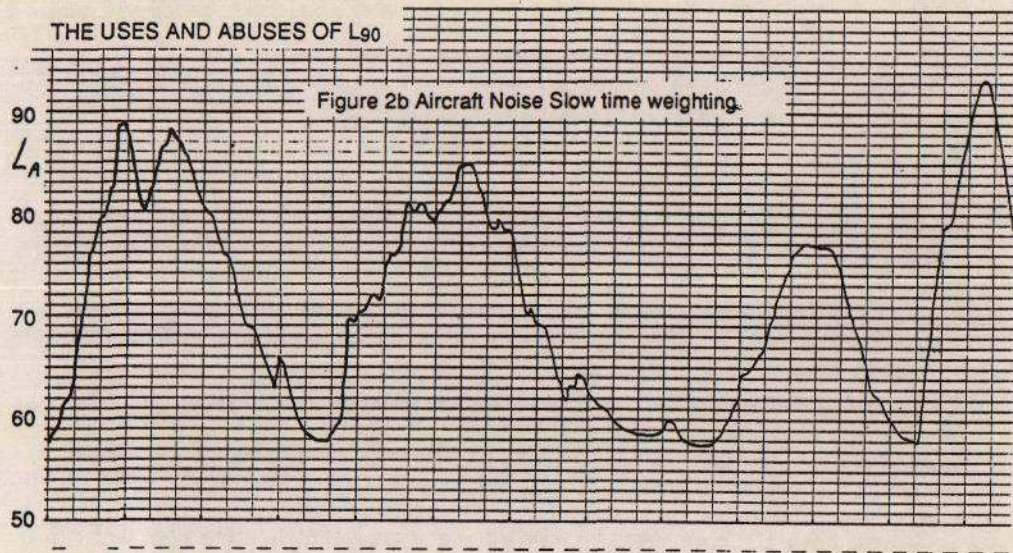


Figure 2

Proceedings of the Institute of Acoustics

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Many modern instruments are idiot proof however there are still some available where we are left in control and incorrect setting can affect the result.

4. Abuses

A Local Authority set the following conditions on a business premises.

"The background (L_{90}) noise levels attributable to the development and measured over any 15 minute reference period should not exceed (a) 46 dB(A) when measured at the curtilage of 1 XXX Road (b) etc". See figure 3 for illustrative site plan.

This condition is in my opinion *ultra vires* for the following reasons:-

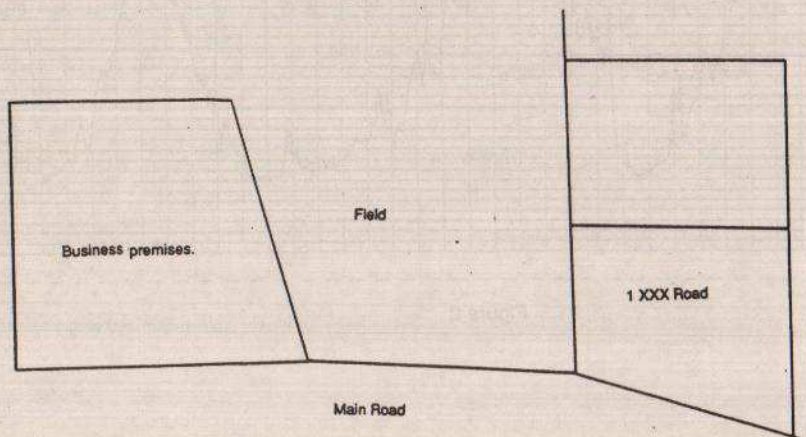
- **inappropriate unit** - that the $LA_{90} T$ measures the background noise level not the specific noise level. The background level at this point is more likely to be affected by the next door neighbour than by the business - **circular 10/73 states that the preferred unit is LA_{eq} .**
- **incorrect monitoring position** - certainly 1 XXX Road is the nearest premises but its curtilage is not contiguous with that of the business; there is a intervening field - **the correct position is the curtilage of the business premises.**
- **not sufficiently defined level and time** - (the stated level of 46 dB is a pre existing background night time level at that site but the day & evening background levels are considerably higher.) thus business could not comply with the order even if they made no noise at all. - **should specify levels and times and which day (Weekday, Saturday, Sunday, daytime, evening, nighttime. etc).**

5. Other uses

If your client asks you whether a new noise source will be audible when it is introduced into the existing environment then comparing A-weighted specific and background levels will not necessarily give the correct answer. A method is to determine the existing L_{90} octave or third octave band background levels and compare those results with the corresponding typical octave or third octave band specific noise levels.

See figure 4 for a trace of an octave band level of a current site prior to the introduction of a new noise.

Figure 3 Site Plan



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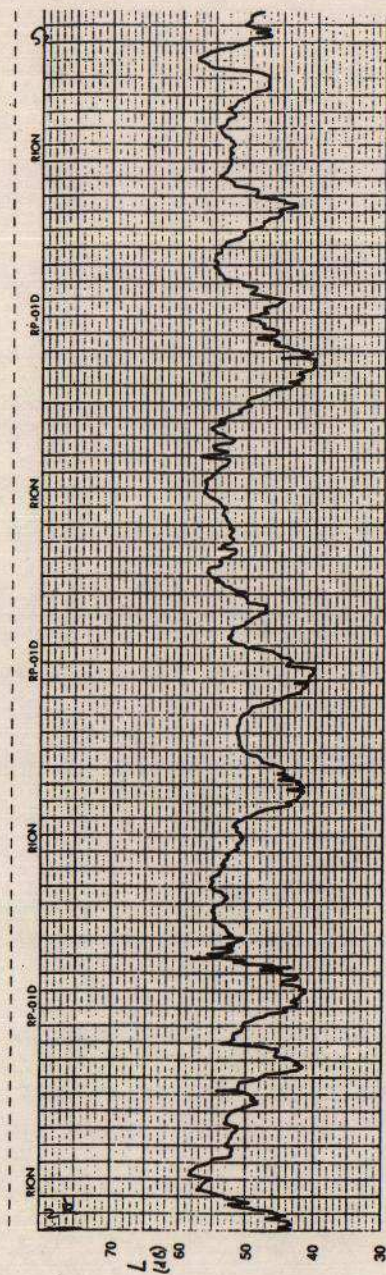


Figure 4 The 2 kHz octave band background level
 Paper speed 1 mm/s. Pen set to fast time weighting
 $L_{90} 2kHz = 44$ dB
 $L_{eq} 2kHz = 53$ dB

