Appendix 18.1: Glossary of Acoustic Terms

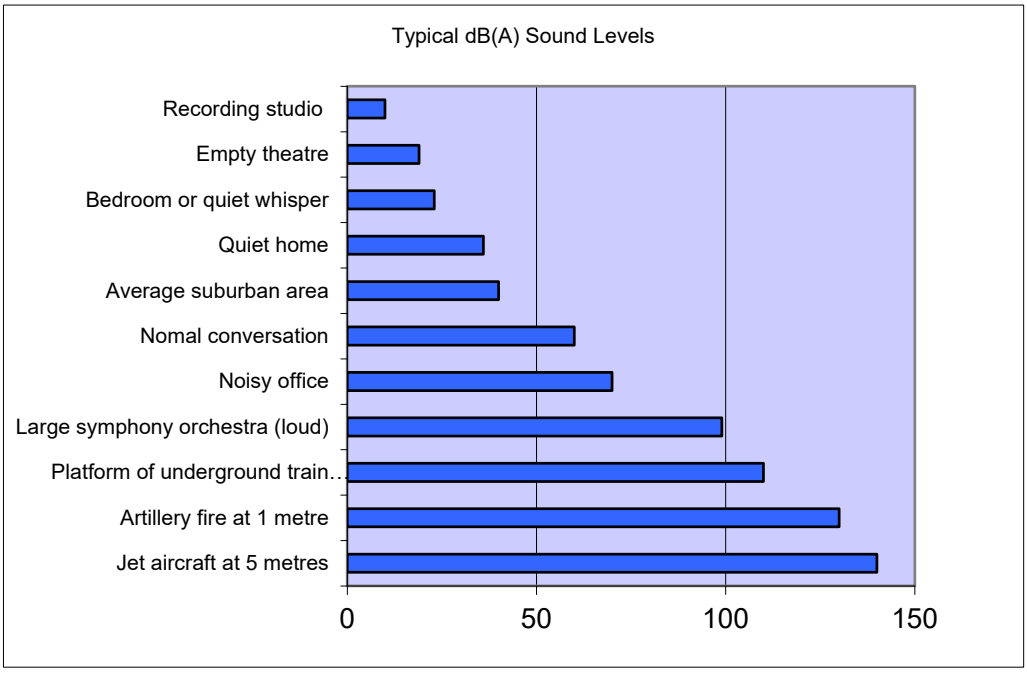
GLOSSARY of ACOUSTIC TERMS

Sound
Sound is usually generated by the vibration of a surface, or by turbulence in the air. This gives rise to pressure fluctuations in the air, or some other elastic medium. Sound is transmitted through the medium as sound waves and may be described in terms of sound pressure or sound power. Noise is generally defined as unwanted sound.

Frequency, Hertz (Hz)
The number of sound pressure fluctuations in a period of one second. Subjectively observed in the human ear as pitch. The audible frequency range for the human ear is 20-20,000 Hz.

Sound Pressure Level, dB
Sound pressure level is measured in units of decibels on a logarithmic scale reference to the threshold of hearing, 2 x 10^{-5} Pascals. This scale is accepted as the best way of measuring the exceedingly wide range of sounds that can be heard by the human ear in a convenient manner. Being a logarithmic scale, a doubling of sound pressure level results in a numerical increase of only 3 decibels. For example if the sound produced by a telephone ringing is 75 decibels, the effect of two similar phones ringing at the same time is 78, not 150 decibels.

'**A' Weighted Sound Pressure Level, dB(A**)
The human ear does not hear sound equally through the audible frequency range. At low frequencies and at very high frequencies the ear is less sensitive. In order to reflect this subjective response, the 'A' weighted network has been devised. The network applies suitable corrections to a noise, dependant on the frequency, so that the resultant 'A' weighted sound pressure level is representative of what would be perceived by the human ear. Subjectively, a difference of 3dB(A) in sound level may be just noticeable and a difference of 10dB(A) represents a doubling or halving of loudness. The graph below shows typical A-weighted sound levels for a range of acoustic environments.



Time Weightings
A time weighting defines how the exponential averaging in RMS measurement is completed. It defines how the fluctuating sound pressure variations are smoothed, or averaged, to allow useful readings. There are 3 weightings: F (fast), S (slow) and I (impulse). Most measurements are completed using the F time weighting, which uses a 125 ms time constant.

Equivalent Continuous Sound Level, $L_{Aeq,T}$
The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time. It can broadly be considered as an average sound level and is the internationally accepted parameter for assessing the annoyance caused by noise from most sources.

Statistical Sound Levels, $L_{A10,T}$ and $L_{A90,T}$.
The level of noise exceeded for, respectively, 10% or 90% of the time period (T) being sampled. The $L_{A10,T}$ level correlates well with road traffic noise disturbance. $L_{A90,T}$ is the parameter most commonly used when quantifying Background Noise Level.

Maximum Sound Level, L_{Amax}
The maximum sound or noise level over a time period. Can be determined in terms of the different time weightings (or time constants), i.e. L_{ASmax} (slow), L_{AFmax} (fast) and L_{Almax} Impulsive).

Sound Power Level L_{wA}
A measure of the total sound energy radiated from a source. Like sound pressure levels this is also expressed in dB(A), but instead it is referenced to 10^{-12} watts. Sound power level is a characteristic of a source and so its value does not vary with distance or environmental conditions.

Broadband
Energy over a wide range of frequencies, often the complete audible frequency range. Broadband measurements will typically cover all audible frequencies in one reading.

Narrow-band
Acoustic Energy over a restricted range of frequencies. Used to ascertain the strength of audible tones, and to assist in identifying particular sources of noise in a complex sound environment.

Ambient Sound Level $L_{Aeq,T}$
Totally encompassing sound in a given situation at a given time usually composed of sound from many sources, near and far.

Specific Sound Level $L_{Aeq,Tr}$
Sound produced by the source under assessment. Measured in terms of the equivalent continuous A-Weighted Sound Pressure Level at an assessment position over a given referred time interval, T_r

Rating Level $LA_{r,Tr}$
The Specific noise level plus any adjustment for the characteristic features of the noise (e.g. tones or impulsivity)

Residual Sound Level $L_{Aeq,T}$
The ambient noise remaining at given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Background Sound Level, $L_{A90,T}$
The A-Weighted sound pressure level of the residual sound level at the assessment position that is exceeded for 90% of a given time interval, T, measured using time weighting, F, and quoted to the nearest whole number of decibels.