

Mosquito High Frequency Sound Deterrent and teenagers/children

The technology is based on the fact that people over 20-25 years of age cannot hear sounds greater than 18KHz. Younger people can hear sounds up to about 20KHz. The loss of this ability in the early 20s is put down to ageing. The conventional range of sounds perceived by the human ear and easily testable are 250Hz to 8KHz. Sounds above 8KHz are normally only tested in research settings.

The principle behind the technology is to discourage teenagers from congregating on street corners etc. by playing a loud high frequency tone, which only young people can hear. If played loud enough it can cause unpleasant symptoms of nausea and tinnitus. The research quotes limits on the noise levels for these symptoms but also on the levels which may cause hearing damage.

The questions are:

- whether these sounds can cause damage to the hearing of teenagers (or children who stray into the path or who happen to live near to where one of these devices is sited).
- If there is any damage – is it in the conventional range which can be measured easily, or is it in the higher frequency range?

From my understanding of the literature (all available on the compound security website) the answer to the first question is No and to the second is we really don't know.

The Mosquito Sound system

Frequency Band

This commercially available device is reported by the manufacturer to operate at a mean frequency range of 17.6KHz with a modulation of 4Hz, although an independent review by AERC quotes a mean frequency of 16.8KHz and a maximum of 18.6KHz. All of the above frequencies fall into the same overall band studied by the established research.

Intensity

The loudness is reported as 76dBA at 3 metres by AERC, quoting a report by the National Physical Laboratory. Some confusion arises over different decibel scales. The 'A' weighting is commonly used when measuring environmental noise, as this is the nearest response to the human ear. Thus AERC reports a volume of 76dBA, which is translated in the report by the National Physical Laboratory (NPL) as 83.2dB (unweighted). The manufacturer quotes also several figures for loudness, depending on the use of an automatic gain control device, which keeps the volume at 5dB above ambient noise levels. However a new switch system can be preset at 5dB intervals from 80-93dB measured at 1metre. So at maximum loudness the volume would be 87dB (unweighted) at 2m and 84dB at 3m (subtract 6dB for every doubling of the distance). However, where the sounds reflect off a hard surface such as a wall, this principle may not be quite true – it really only applies in a room of infinite size where there are no walls.

The research

The established research quoted in the HSE report 343/2001 suggests a maximum permissible level of 75-85 dB sound pressure level for this frequency. This level was set to avoid unpleasant but not necessarily harmful effects, such as nausea and tinnitus. The specified limits for the frequency band in question vary between 75-90dB unweighted. Frequencies up to 20KHz are the most studied and this is the cut-off point between very high frequency (VHF) and ultrasonic frequencies. The research was to find those intensities at various frequencies which do not cause a temporary threshold shift, on the basis that what cannot cause a temporary dullness of hearing cannot cause a permanent problem. It is also known that VHF sound is much less damaging to the main audiometric frequencies (<8KHz) than an equal level of ordinary wideband noise. The frequencies implicated are beyond the reach of conventional audiometry at present.

Limits for occupational hearing damage in the context of an 8 hour working day are also given between 75-85dB and between 84-97dB for 1 hour exposure. The latter are probably more relevant to the Mosquito device, which falls within the tolerance.

The NPL also considered the current (2005) UK 'Noise at Work' regulations, which specify a level equivalent to 94dBA for 1 hour. The Mosquito (at 76dBA) would not therefore present as a noise hazard under these regulations. Even when the maximum permissible level was reduced in 2006, to 80dBA in 8 hours the level of 76dBA was still well below.

Automatic Shut Down

The Mosquito device automatically shuts down after 20 mins and cannot be reactivated for at least a further 20 mins.

Field of Spread

The effective field is a 60 degree angle out to a range of 15 metres, at which distance the volume is almost negligible.

The Law

The AERC report details all the legislation regarding noise and the environment. Basically the Mosquito doesn't contravene any of it.

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