Measuring Disturbance Related to Aircraft Noise

Some of the greatest difficulties in determining an acceptable method of measuring disturbance related to aircraft noise are the changing expectations and reactions of people affected by that noise and the changing nature of the source of that noise.

Over time the demographics of a given area may change and with it the expectation for what is an acceptable quality of life. Equally the source of the disturbance may change significantly in terms of the level of each disturbance together with the number of incidents of that disturbance.

Thus it is reasonable to consider whether a method considered acceptable 20 or 30 years ago is acceptable today. This is particularly true when that measurement is presented in the form of an average measurement. At the Fifth Terminal Inquiry the point was made that the disturbance caused by a number of 747 movements could be reflected by the same measurement as a single Concorde movement using the Leq system although the type and level of disturbance is clearly different.

For a long time there was no specific attempt to measure the disturbance created by aircraft noise but with the advent of the increased level of using jet aircraft in Civil Aviation in the late 50`s and early 60`s it became more of an issue. This resulted in the creation in 1963 of the Number and Noise Index (NNI) to report aircraft noise.

Basically NNI recorded the average noise related to the number of aircraft that recorded a noise level exceeding 80 PndB at a given location during the period 0700/1900. At that time there were far fewer aircraft movements and many of them were considerably more noisy than they are today.

By 1980 this index was deemed inadequate both from the point of view of the method of measurement, e.g it ignored movements that incurred a noise levels less the 80 PndB, did not cover an adequate period during the day and was out of line with other methods of assessing noise throughout the world.

This resulted in the ANIS report in 1982/3 from which was developed the Leq system. This measures the total energy developed by aircraft movements then converts it to an average over any given period. It was determined that the period should be for 16 hours, i.e. 0700/2300. It

should be noted that the extremely busy period 0600/0700 continued to be omitted.

There are a number of things to note about the weaknesses that came to be perceived with $L_Aeq_{(16h)}$ measurement:

When the Anis report was compiled there was far more concern about take off noise than landing noise. This is no longer so to the same extent.

Aircraft performance has improved considerably so that they are less noisy now. This is particularly true for takeoffs.

The averaging of the measurement is seen as a weakness in itself

The measurements for developing contours are taken during 92 days in the summer period. This can result in a distribution that differs significantly from the year round distribution, e.g the normal year round distribution is considered to be 30% eastbound operations and 70% westbound. The most recent contours were based on 17% eastbound and 83% westbound thus giving a considerable distortion to the contours.

As a result of concerns about the inadequacies of the $L_Aeq_{(16h)}$ system at the Fifth Terminal Inquiry the Inspector recommended that a limit of 480,000 atms (aircraft movements) be imposed at Heathrow until the issues could be resolved. This was accepted by the government of the day and an investigation was promised in which all could have confidence and which would inform future decisions related to aviation. The result was the ANASE Report. Published in 2007, the ANASE study supported the concerns expressed by the Fifth Terminal Inspector in two key aspects:

1. there is now a much greater relationship between the number of aircraft movements and the perceived level of disturbance; and

2. For a given LAeq the annoyance level was found to be considerably higher during the research conducted for the ANASE Report than that at the time of the ANIS Report.

Peer reviewers expressed concerns about the reliability of the valuations coming from the study and suggested further analysis, detailed revisions and improvements to the drafting. No such work ever appears to have been published and specific findings linking increased disturbance being

correlated to the number of movements appears to have been ignored.

The new Lden/Lnight measurements afford some improvements to the Laeq16 system and there are a number of other systems such as N70 contours developed for Sydney which indicate the number of aircraft movements above a given decibel reading but they all have their weaknesses. For example the N70 will not indicate the increased level of disturbance if the aircraft have a much higher decibel level than that chosen or if too high it will not adequately reflect the level of disturbance related to aircraft causing a lower reading.

What this points to is a commonly held view that the actual number of people who will be affected by decisions related to Heathrow is far greater than most other airports which warrants a special study considering Heathrow on a stand alone basis.