FAA Integrated Noise Model

The Federal Aviation Administration's (FAA), Office of Environment and Energy (AEE-100) has developed the Integrated Noise Model (INM) for evaluating aircraft noise impacts in the vicinity of airports. The current INM series has been ordered and shipped to over 650 organizations worldwide making it the most popular model of its kind. The distribution package for the model includes the INM software on CD-ROM, a User's Guide, and a Technical Manual.

INM has many analytical uses, such as assessing changes in noise impact resulting from new or extended runways or runway configurations, assessing new traffic demand and fleet mix, evaluating revised routing and airspace structures and assessing alternative flight profiles or modifications to other operational procedures. The INM has been the FAA's standard tool since 1978 for determining the predicted noise impact in the vicinity of airports. Statutory requirements for INM use are defined in FAA Order 1050.D, Policies and Procedures for Considering Environmental Impacts; Order 5050.4A, Airport Environmental Handbook; and Federal Aviation Regulations (FAR) Part 150, Airport Noise Compatibility Planning.

The model utilizes flight track information, aircraft fleet mix, standard and user defined aircraft profiles and terrain as inputs. The INM produces noise exposure contours that are used for land use compatibility maps. The INM program includes built in tools for comparing contours and utilities that facilitate easy export to commercial Geographic Information Systems. The model also calculates predicted noise at specific locations such as hospitals, schools or other sensitive locations. For these grid points, the model reports detailed information for the analyst to determine which events contribute most significantly to the noise at that location. The model supports 13 predefined noise metrics which include cumulative sound exposure, maximum sound level and time above metrics from both the A-Weighted and the Effective Perceived noise level families. The user may also create their own metric type from these families, a popular example being the ability to create the Australian version of the Noise Exposure Forecast (NEF).

The INM aircraft profile and noise calculation algorithms are based on several guidance documents published by the Society of Automotive Engineers (SAE). These include the SAE-AIR-1845 report titled "Procedure for the Calculation of Airplane Noise in the Vicinity of Airports" as well others which address atmospheric absorption and noise attenuation. The INM is an average-value-model and is designed to estimate long-term average effects using average annual input conditions. Because of this, differences between predicted and measured values can sometimes occur because certain local acoustical variables are not averaged, or because they may not be explicitly modeled in INM. Examples of detailed local acoustical variables include temperature profiles, wind gradients, humidity effects, ground absorption, individual aircraft directivity patterns and sound diffraction around terrain, buildings, barriers, etc. Differences may also occur due to errors or improper procedures employed during the collection of the measured data.

Information concerning INM distribution may be found on the AEE-100 Web page: http://www.aee.faa.gov/aee-100 or by contacting AEE-100 at 202-267-8933.