NOISE MODELING

How does it work?

MODELING VS. MEASUREMENT

Direct measurement of noise with microphones and Sound Level Meters is useful for local measurement of a single condition at a single point of time and at a single location.

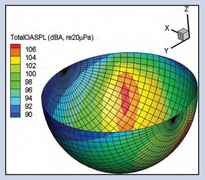
Modeling is used to predict a whole year (or more) of activity, and can use aircraft that may not currently be located there. It allows for testing different options (numbers or types of aircraft, for instance), across a larger area, such as the area surrounding an airfield or training area. It is usually not practical to take detailed measurements across a long period of time, and is impossible to do for aircraft or conditions that are only proposed (future aircraft basing or a runway construction project, for instance).

The goal of a noise model is to provide information about the noise environment at all hours of the day on an annual basis, at ALL locations surrounding the airfield. This provides an annual average sound level that Federal and State Governments have determined are the most useful for predicting annoyance and impacts to activities near airports.

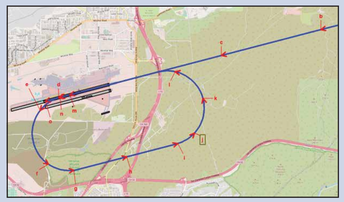
This is done by carefully measuring each aircraft type in a controlled environment and then applying it to various locations where they fly.

BUILDING THE MODEL

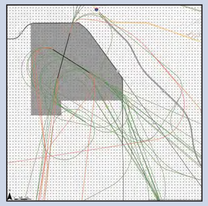
After all the measurements are completed, we have a very good understanding of just how much sound pressure is produced in various directions (vertically and laterally) around the aircraft, for each aircraft type and flight condition.



Every aircraft type is modeled as they are expected to fly around the airfield. Each point along each of these paths includes data for altitude, speed, configuration, power setting, and other variables.

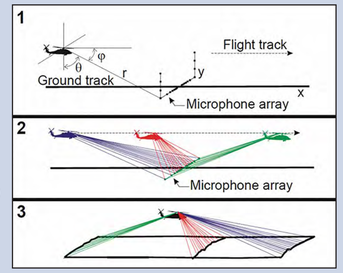


A large grid of points on the ground is created from the model. The sound from each aircraft to each of the points on the ground is calculated and added up so that it can be determined how much noise is present at every point on the map.



CAPTURING THE DATA

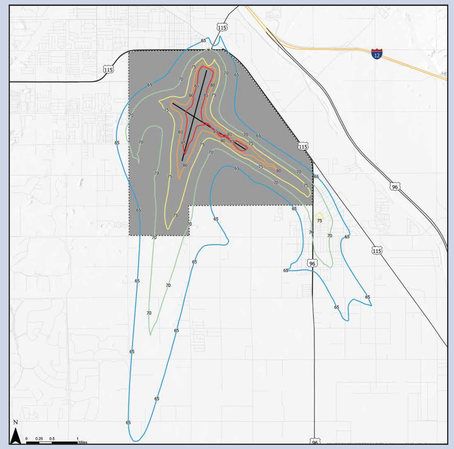
In the model development stage, every aircraft type is measured in flight by a large array of microphones. Many measurements are made to cover a full spectrum of speeds, configurations (landing gear and flaps), power settings, and altitudes. Flying by the microphone array allows us to know how loud an aircraft is not only while overhead, but also in front of or behind it while it is in flight.



Aircraft are also measured on the ground, from various angles and at various power settings so that the noise produced by startup, taxiing, and maintenance actions can also be incorporated into the model.

RESULTS

Once the noise levels at each point of the grid are fully calculated, noise contours are created by connecting points of equal value. This works like elevations on a topographic map.



In addition to annual values depicted by the noise contours, the noise modeling process can provide more specific information about individual locations, using a variety of different metrics, such as Maximum Sound Level and Sound Exposure Level.

Recent studies have been conducted, comparing many days of measured noise data to the predicted modeling results. This effort has served to validate that the models are accurately projecting the levels of noise in the areas around and airfield.