High Altitude Aircraft Noise Methodology for AEDT/INM

ACRP Staff Comments: Several ACRP studies are focused on enhancing the industry's air and noise models: EDMS, INM, and AEDT; the proposed research would further advance modeling accuracy as the topic of high-altitude noise impacts has not been addressed previously.

TRB Aviation Group Committees Comments: ENVIRONMENTAL IMPACTS OF AVIATION: Support, though this should be FAA research. Understanding high-altitude noise is important, but there are major FAA policy issues and airport cost issues raised by such work. This project would be beneficial if the intent is to provide data that FAA might use to validate or modify its noise policies.

Review Panel Comments: Recommended.—There is a gap in modeling aircraft as they transition past 10,000 feet. Although FAA has started looking at this in a limited manner, more effort is required.
1. Problem Statement Title:
High altitude aircraft noise methodology for AEDT/INM

2. Background:
When conducting a FAR Part 150 noise analysis, analysts use the Federal Aviation Administration’s (FAA) Integrated Noise Model (INM), soon to be replaced with the Aviation Environmental Design Tool (AEDT), to model the effects of aircraft noise in the vicinity of airports. Typically, the noise levels in the vicinity of an airport are dominated by aircraft arrivals and departures. For this reason, AEDT/INM use a database and noise propagation methods developed for modeling noise from aircraft operations at low altitudes (below 10,000 feet).

As technology improves, resulting in quieter aircraft departure and approach operations, and airports become more interested in evaluating aircraft noise levels farther away from the airport, noise from high altitude (or en-route) aircraft operations begins to be of interest. Currently, AEDT/INM use data and noise propagation methods developed for modeling low altitude aircraft operations (below 10,000 feet) to model high altitude aircraft operations. However, noise propagation over long distances, with geo-spatially varying meteorological conditions and unique aircraft cruise noise source characteristics, can be significantly different than the data and propagation methods used at lower altitudes. These assumptions can result in inaccurate predictions of noise due to en-route aircraft operations. The extent of these inaccuracies has not been quantified, as a suitable validation data set has not yet been identified.

While some research has been conducted into developing an en-route aircraft noise modeling methodology for implementation in AEDT/INM, more research is needed. In particular, a high quality measurement database of noise, performance and position data from high altitude aircraft operations is necessary for validating this method. Having a validated method for modeling noise from high altitude aircraft operations will help analysts more accurately model aircraft noise levels in the vicinity of airports.

3. Objective:
To develop a method for modeling noise from high altitude aircraft operations in AEDT/INM, and to validate that method.

4. Proposed Tasks:
This research should include recommendations on the development of a noise propagation model from high altitude aircraft operations in AEDT/INM, recommendations on the development of a high altitude aircraft database for AEDT/INM, implementation guidance, validation data measurement and analysis, and a sensitivity analysis.

5. Estimated Funding:
The estimated funds necessary to accomplish the objective is $460,000.

6. Estimated Research Duration:
The estimated duration necessary to accomplish the objective is 24 months.

7. Related Research:
Prior research into the development of a method for modeling en-route aircraft sound propagation was conducted by the Pennsylvania State University and documented in “Adaptation of INM to en route noise propagation” (This work was completed by the Pennsylvania State University under contract with the U.S. Department of Transportation’s John A Volpe National Transportation Systems Center, Contract #DTRT57-11-C-10012). Initial research into the development
of a method for modeling en-route aircraft sound source noise was conducted by the Georgia Institute of Technology and documented in “En Route Jet Aircraft Noise Analysis” (This work was completed by the Georgia Institute of Technology under contract with the U.S. Department of Transportation’s John A Volpe National Transportation Systems Center, Contract #DTRT57-10-D-30015 DTRTV-T01001). The recommendations from these previous research efforts have not been integrated, nor have they been implemented in AEDT/INM. Furthermore, these methods and data have not been validated against measurement data. Development of a high altitude aircraft noise prediction methodology for AEDT/INM should make use of these findings.

8. Process Used to Develop Problem Statement:

This problem statement was developed by the individuals listed in Section 9 below as a result of discussions held at FAA Tools workshops. This problem statement is the product of the TRB Committee ADC40 “Transportation-Related Noise and Vibration” Aircraft Noise subcommittee.

9. Person Submitting Problem Statement and Date

This problem statement is submitted on March 14, 2013

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