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NOISE MITIGATION FOR AIRPORT GROWTH

Aviation noise remains one of the most serious constraints to expansion and improvement of the air transportation system in a growing number of nations. And despite the progress already made, it will remain a continuing problem for the foreseeable future.

Aviation noise first became a national issue with the introduction of large passenger jet aircraft in the 1960's. The economic vitality of jet service triggered explosive growth both in the air transportation industry and in those cities and industries it serviced. This growth also increased the level of aviation-generated noise. As airports grew in size and in importance, the areas they impacted expanded. When the number of jet operations reached a level where the noise interfered with daily life for the citizens who reside near these growing airports, many countries were forced to address aviation noise.

Governments and industry have sponsored research into ways to resolve the growing noise problem. Aircraft and engine manufacturers jointly developed new jet engine technologies that produced both lower noise levels and higher fuel-efficiency. Certification standards were developed for measuring and for limiting aircraft noise at the source. These certification standards, which paralleled technological improvements in airplane engine designs, are contained in the ICAO Annex 16. The adoption of these standards by many ICAO-member countries prevented the further escalation of aircraft noise levels and required new airplane types to be markedly quieter than the earlier generation of turbojets. Airplanes certified under this new standard were said to have met Chapter 2 noise levels. Subsequent revisions to ICAO Annex 16 in 1977 established Chapter 3 noise certification standards at a lower noise level than Chapter 2, and a later amendment prohibited the manufacture of Chapter 2 airplanes after a certain cutoff date.

The result is that many nations will be transitioning their fleets to the quieter Chapter 3 airplanes in accordance with the April 1, 2002 schedule established by ICAO. The United States completed the transition a little earlier in January 2000. These transitions have resulted in many Chapter 2 airplanes being modified to achieve the lower Chapter 3 noise levels by installing newer engines or hushkits, or by re-certification to Chapter 3 with modified weight, flap and/or wing configurations. Another result has been the removal of a large number of Chapter 2 airplanes from operation in these countries, making them available in areas of the world where there are no noise limitations.

Nations need to establish aviation noise policies and

programs very soon if they wish to avoid being a dumping ground for older, noisier airplanes being phased out of operation around the world.

The gradual transition to quieter large commercial airplanes will continue to have a major effect in reducing airplane noise in many nations around the world. A recent ICAO study concluded that the overall forecast is for a significant reduction in noise through 2002, as quieter airplanes replace the current models. Beyond that, a slow and steady growth in the demand for aviation services is predicted into and beyond the first decade of the 21st century. This growth in numbers will negate the gains made through retirement of hushkitted aircraft, and the result will be a gradual increase in world noise exposure.

In an attempt to prevent this inevitable increase, ICAO member nations have placed a high priority on the continued development of aircraft noise reduction technology to support the continued expansion of the international aviation system. In early 1992, the United States began a multiyear program focused on achieving significant noise reduction with a goal reducing the community noise impact of future airplanes by 10 dB. While that goal has not been fully achieved, ICAO is currently working toward the establishment of Chapter 4 standards very early in the new millennium. Agreement will eventually be reached, a standard will be implemented, and transition schedules will be debated and ultimately adopted for a transition to Chapter 4. Although there will probably be no regulatory phase-out of airplanes considered to be "marginally" Chapter 3, (those that were modified from Chapter 2, and some of the earliest design Chapter 3 airplanes, such as the MD-80), there will be pressure on the airlines to phase out these aircraft. The effect of recent events may speed up this process. Several U.S. Airlines have announced plans to expedite the retirement of their older, noisier airplanes, in response to the short-term drop in demand in the aftermath of the terrorist attack. As this occurs, there will be another round of disposal of the noisiest airplanes to the fleets of those nations without noise policies of their own. Although security is the most pressing aviation concern in the near future, a lesson one can learn from past events (i.e., the Gulf war) is that the demand for aviation services is destined to return to long-term projected growth levels. When demand returns, then capacity and noise will again be among aviation's highest priority issues.

Although noise reduction at the source is the most efficient way to mitigate community noise, it is of necessity a long-term solution that only produces the full results when current airplanes are retired and replaced, some 20 to 25 years from now. Most nations with noise programs, and those in the process of developing programs, incorporate a wide variety of other mitigation measures to protect their citizens from aviation noise.

Operational measures can play a large role in airport noise abatement programs. One of the most common measures is preferential runway use. Airport proprietors and Air Traffic Control (ATC) encourage operators to use the runways with the least noise impact to the maximum extent possible. A variation of this is head-to-head operations during periods of low demand. Another common measure is noise abatement departure procedures where minimum

climb power is used over noise sensitive areas near airports. Noise abatement flight tracks are used where feasible to route air traffic away from noise sensitive areas and over more compatible land uses.

In addition to the operational measures currently available to address noise, emerging navigation technology using Global Positioning Systems (GPS) will enable pilots to fly very high resolution, curved noise abatement flight tracks that are predictable and repeatable with a high degree of precision. The precision curved flight tracks can be established over the most compatible land uses such as highways, rivers and vacant land.

Airport noise compatibility planning used by many airports and local officials to minimize aviation noise impacts, focuses on land use within noise impacted areas. It requires a comprehensive evaluation of existing and future noise exposure around an airport, the selection of effective measures to reduce noise and non-compatible land uses, and the implementation of those measures by appropriate parties. This usually requires extensive cooperation and coordination among local communities, aviation interests, and those responsible for the planning, development, and care of the surrounding environment. The common land use measures applied by most nations include:

- Zoning to prohibit noise sensitive development, such as homes, schools and hospitals.
- Building codes that require additional sound insulation for noise sensitive buildings.
- Acquisition of non-compatible land so that the property may either be redeveloped for compatible use or may remain vacant for safety reasons.
- Sound insulation programs for homes and schools that are already exposed to unacceptable noise levels.

Zoning is probably the most effective land use measure, but requires the full cooperation of local governments, and of course is only applicable for uninhabited land or property that can be redeveloped. For areas with existing houses, residential sound insulation programs will continue to be the most popular measure available to mitigate noise impacts on people.

Airport capacity lags growing demand in many countries, and noise impact is often the main constraint to meeting the demand. New airports and new runways are highly contentious, and often take years of political maneuvering and litigation to be approved. In many countries noise caps, curfews and budgets have been employed in response to noise impacts, which further exacerbate the capacity problem.

ICAO studies clearly indicate that fleet mix is the most critical variable in projecting future noise contours around airports, and that this variable alone can determine whether airport noise contours will shrink or grow. If passenger demand and airport operations steadily increase as predicted after the Stage 2 phaseout is completed, some renewed expansion of noise contours around airports will result along with new areas of incompatible land use. The consequences of such increases could prove very costly, and clearly would be

undesirable for airports and local governments.

The most cost-effective and least disruptive approach to airport noise mitigation is to anticipate future problems and address them now before they become insurmountable later. Thus, solutions that do not affect airport capacity or financial vitality can be found. Sophisticated and reliable planning tools are currently available to assist in identifying and designing these solutions.

Those developing nations with growing demands for air transportation that recognize the constraints that aviation noise can have on their aviation systems, and respond early on with a national aviation noise abatement program, will advance their programs far more efficiently and effectively than those nations that wait until their citizens demand action to abate aviation noise.

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10/01

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