

craft noise in the United States has been the joint concern of the Federal Government, airport operators, aircraft manufacturers, air carriers and airline pilots. Indeed, substantial gains have already been made in the alleviation of aircraft noise. Airframe manufacturers, air carriers and powerplant manufacturers have conducted extensive research and development on aircraft noise suppression and have devoted vast facilities and manpower to reducing the level of aircraft noise.

Long before jets, the airlines recognized the disturbance that aircraft noise created for many airport neighbors. As early as 1952, the carriers and the pilots established a task group to develop special takeoff and landing procedures for noise abatement purposes. Special procedures were promulgated for such piston aircraft as the DC-6, the Constellation, the DC-7, and others. These procedures were highly costly, since they introduced unnatural flight methods and delays, but they were successful—within the technological and physical limitations under which they had to be employed. And they resulted in definite and significant reductions in noise under takeoff paths at the airports from which those aircraft operated.

When jets came into service in 1959, the airlines, in cooperation with the FAA, manufacturers, pilots and airport operators, developed new and different takeoff and landing noise-abatement procedures for the jet aircraft. These procedures are still in wide use today, and have produced significant limitations of noise levels and exposure areas.¹

Currently, the airlines and their pilots, in close collaboration with FAA, are perfecting an even more efficient noise-abatement procedure for jets, referred to as the "noise-abatement takeoff profile". The operation is essentially a three-stage procedure which substantially reduces noise exposure in terms of flyover time. It holds the promise of even more significant reductions in noise-exposure under takeoff paths. Hopefully, the new three-stage profile will ultimately be adopted uniformly throughout the United States for all jet transport takeoffs.

The efforts of the industry have been directed along many fronts. Within less than a year after the introduction of jets, the aviation community formed a non-profit organization to coordinate nationwide planning and procedures for the reduction of carrier aircraft noise. Known as the National Aircraft Noise Abatement Council, or "NANAC", it is composed of the Aerospace Industries Association (consisting of the principal airframe and engine manufacturers), the Air Line Pilots Association (comprising 15,000 licensed commercial airlines pilots), and the Air Transport Association of America (made up of the 36 scheduled certificated-route carriers of the United States). Subsequently the organization was expanded by the participation of the Airport Operators Council (now the Airport Operators Council International, made up of 107 member organizations, representing more than 600 public airports in the 50 states of the United States, and 10 foreign states), and the American Association of Airport Executives (the managers and directors of more than 400 airports throughout the United States).

NANAC has been responsible for the performance of extensive research in connection with the reduction of aircraft noise at source (i.e., aircraft engine and frame design), flight procedures for noise reduction, and improvements in ground environment. NANAC was a pioneer and the leading force in bringing about widespread cooperative noise abatement programs throughout the United States, and participated in by the Federal Aviation Agency, airport operators, pilots and airlines, including the establishment of preferential runways and other noise-limiting flight procedures at many major airports, the initiation of widespread community joint noise-abatement standing committees, and the establishment of an organized noise complaint and advisory center.

In wide use at airports of the United States are refined take-off procedures, developed and tailored by NANAC to produce the smallest amount of noise commensurate with safety requirements and to confine noise to the smallest possible area adjacent to the airport. NANAC has also developed and secured wide acceptance and application of the increased 3° visual glide-slope and of uniform carrier maintenance planning, under which the number and duration of high-power maintenance ground run-ups during nighttime hours are rigidly restricted.

Among the many contributions of NANAC to aircraft noise abatement is an Operations Research Model for a systems solution of the total aircraft airport-environment complex. The output of the project will be the optimum combination

¹These operational procedures are reported in detail in the Report of the President's *Jet Aircraft Noise Panel*, dated March, 1966.