

Active Noise Control for Airports

June 2021

Active Noise Control

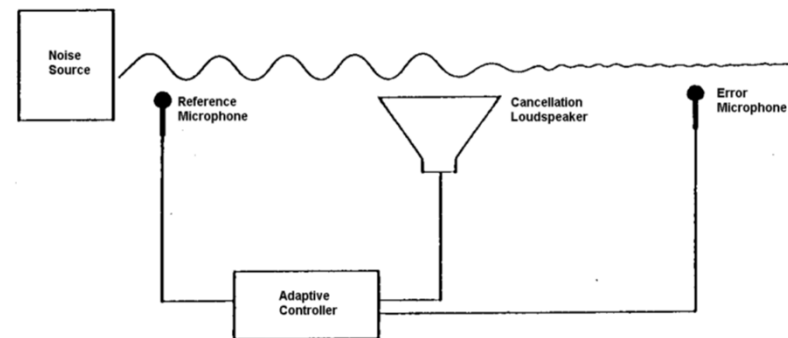
- Proven technology
- Possible applications
- FAA request for pre-applications for pilot programs
- LRAA pre-application



ANC of jet engine run up noise

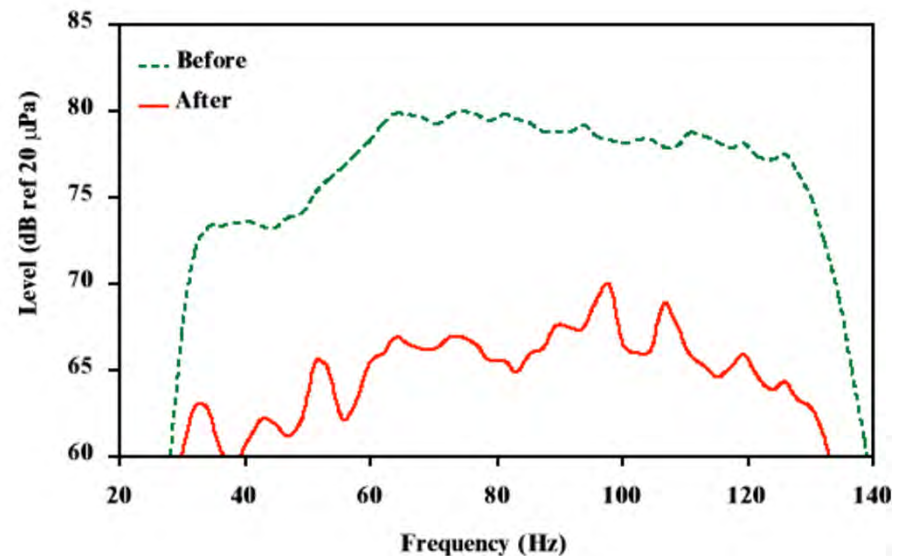
Proven Technology

- Active Reduction of Airport Noise
 - Paper provided by Wyle Laboratories at inter.noise 2000
 - Team member, Prof. C. Fuller was the lead on the Wyle ANC project
- ANC modifies the radiated noise from the aircraft at low frequencies
 - Effective at noise reduction to both the exterior and interior noise levels in the community



Proven Technology

- ANC is based on interference that occurs when two sound waves are combined
- A secondary noise source (loudspeakers) is used to generate noise out of phase to that created by the unwanted noise
- Noise reduction occurs over an area where the two sound waves are out of phase
- Active control of broadband, random jet noise is achievable
- A digital controller is used to generate the active signals to the speakers in real time



Measured take-off noise reduction at BWI

Proven Technology

- Global Reduction

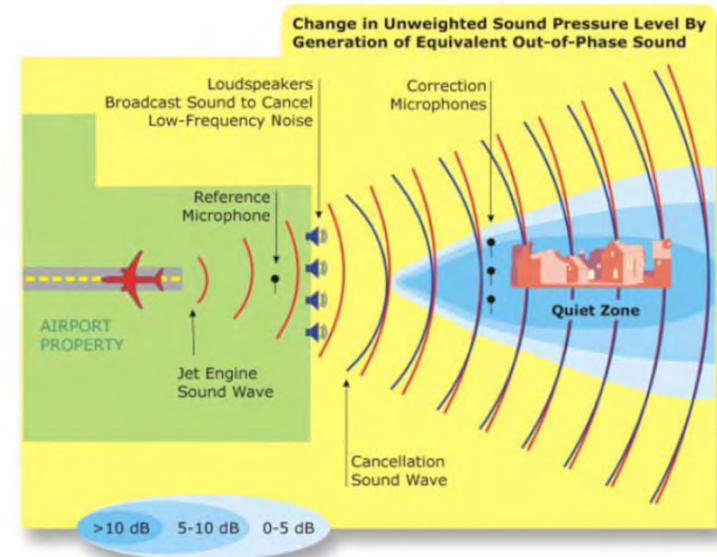
- Requires placement of controlled noise source near the source of unwanted noise - the closer it is, the more global the noise reduction
- Requires the active source to generate high sound levels
 - More possible today than when the technology was proven with the improved speaker and controller technology over the past two decades

- Local Reduction

- Can be achieved at a distance from the aircraft where noise levels are lower and can be easily generated by an array of artificial sound sources
- Noise reduction occurs in the community, not at the source or on the airport property
 - May require speakers be installed in the community rather than at the airport or on the airport boundary

Proven Technology

- System tested on the boundary of BWI with just three active speakers located on the boundary fence
- Reductions of 10dB+ of jet aircraft takeoff noise achieved over an area of roughly five football fields at 45deg to the rear of the jet
- A larger cancellation area will be achieved with an increase in the number of active sources



Possible Areas of Implementation

- Behind Start-of-Takeoff

- Low-frequency noise behind and sideline to aircraft departures continues to be an issue for some communities
- Low-frequency noise to the rear and side of departing aircraft can seem nearly continuous in the community during peak departure periods

- Ground Engine Run-ups

- Low-frequency noise from engine run-ups required as part of aircraft maintenance can be an annoyance to communities
 - Some airports have installed enclosures to reduce the noise passively
 - Some airports have little to no room for such enclosures

FAA Request

- Section 190 of the 2018 FAA Reauthorization Act authorized the FAA to carry out Airport Environmental Mitigation Pilot Program
- FAA will provide grants to airport sponsors for 50% of the cost to support up to six pilot programs
- FAA is requesting pre-applications from airport sponsors



Consortium

- Projects are to be carried out by an eligible consortium consisting of two or more of the following entities:
 - Businesses incorporated in the U.S.
 - Public or private educational or research organizations located in the U.S.
 - Entities of state or local governments in the U.S.
 - Federal laboratories
- HMMH teamed up with the National Institute of Aerospace (NIA) to carry out the ANC noise mitigation pilot program
 - NIA, created by NASA, collaborates with NASA, other government agencies and laboratories, universities (including Virginia Tech that assisted Wyle with proving the ANC technology), and industry to conduct leading-edge research and technology development

Consortium Members

- Louisville Muhammed Ali International Airport

- HMMH

Gene Reindel: Airport noise consultant with expertise in noise mitigation and land use compatibility programs

Joe Czech: Assisted with ANC research during his time at Wyle prior to joining HMMH

- National Institute of Aerospace

Prof. Chris Fuller: World recognized expert in ANC, team leader of work on Wyle ANC of aircraft take-off and hush house noise, developments and testing

Pre-Application

- Submitted by airport sponsors that will contribute the 50% match to the FAA grant
 - Submitted to the airport sponsor's Regional or Airport District Office (ADO)
- Requires the following information:
 - Project title, location and identification of the consortium
 - Description of roles and responsibilities of each entity
 - Pre-application is to be signed by each entity
 - Project description, anticipated benefits and how the project will meet the program's goals of funding mitigation that is not widely available at airports
 - Description of how environmental benefits will be measured
 - Schedule showing completion within 24 months
- *Due by 5 pm Eastern Time on July 9, 2021*

LRAA Pre-Application

- Up to three (3) installations of active noise control systems for start of take-off noise behind aircraft
 - Runway 17R – potential benefit to Southside and Beechmont
 - Runway 29 – potential benefit to Lynnview
 - Runway 35R – potential benefit to Edgewood

