

ACOUSTICS2008/3080

Aeroacoustic research complex for aircraft source noise characterization

Micah Downing^a, Robert McKinley^b, John Hall^b, Frank Mobley^b and Michael James^a

^aBlue Ridge Research and Consulting, 13 1/2 W. Walnut St., Asheville, NC 28801, USA

^bAir Force Research Laboratory, AFRL/RHCB, 2610 Seventh St., Bldg 441, Wright-Patterson AFB, OH 45433, USA

Aircraft noise has been traditionally measured with either a few ground-based microphones or a linear ground-plane array of microphones. These techniques capture one-dimensional and/or two-dimensional characteristics of aircraft flight noise. The US Air Force Research Laboratory has started the construction of a 3-dimensional measurement facility at White Sands Missile Range in New Mexico. This facility, the Aeroacoustic Research Complex (ARC), will allow aircraft to fly through the array, collecting fully 3D acoustic data. ARC is initially being developed in two phases. The first phase includes two 91.4 m tall towers separated by 244 m and will focus on noise from rotary wing and UAV aircraft. The second phase will add two 366 m tall towers separated by 610 m and will focus on large and high performance fixed wing aircraft. This facility will allow more accurate characterization of in-flight noise directivity by providing synchronized 3-dimensional magnitude & spectral acoustical signatures from 50+ microphones. ARC responds to a critical need for validation of existing predictive acoustic models. Such models are used for aircraft design, survivability, nonlinear acoustic propagation research and assessing noise exposure to residents living adjacent to airfields.