SEA Ground Noise Study Kickoff Discussion

Presented to the StART

Brad Nicholas, HMMH

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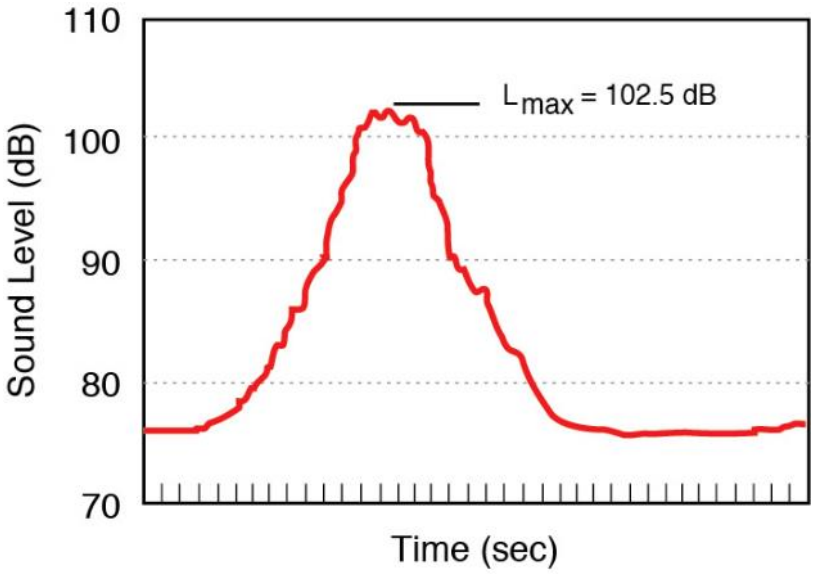
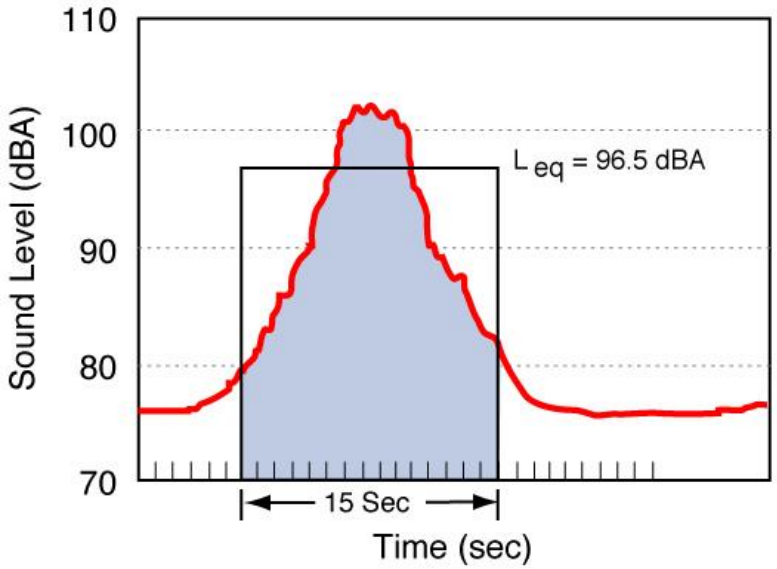
Agenda

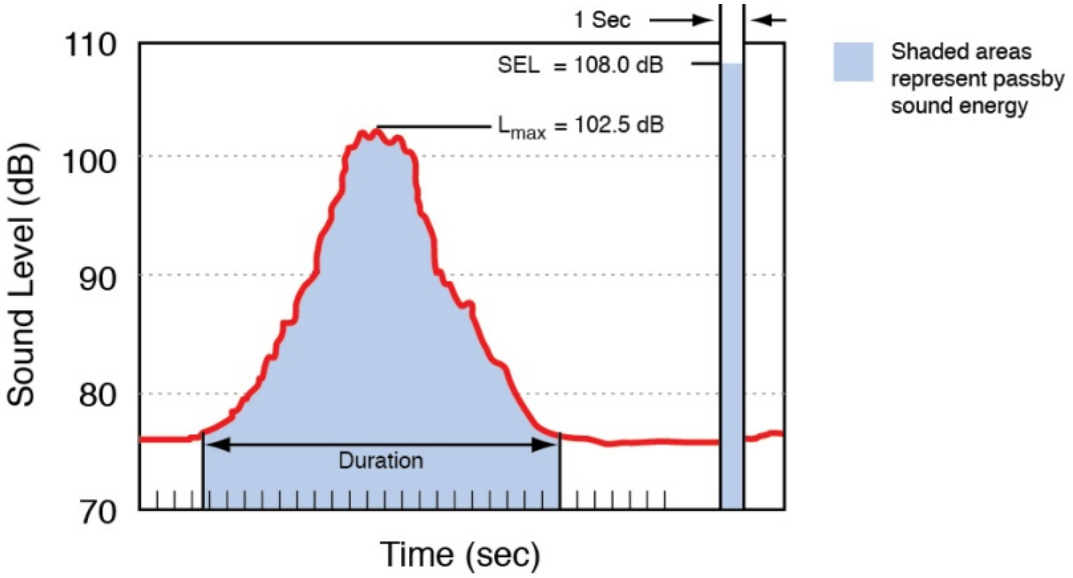
- Acoustical Terminology
- Aircraft Noise Effects on Human Activity
- Sound Propagation
- Ground Noise Study Scope
- Ground Noise Sources Input
- Noise Monitoring Discusssion

Acoustical Terminology

- Maximum A-weighted Sound Level (Lmax)
- Sound Exposure Level (SEL)
- Equivalent Sound Level (Leq)





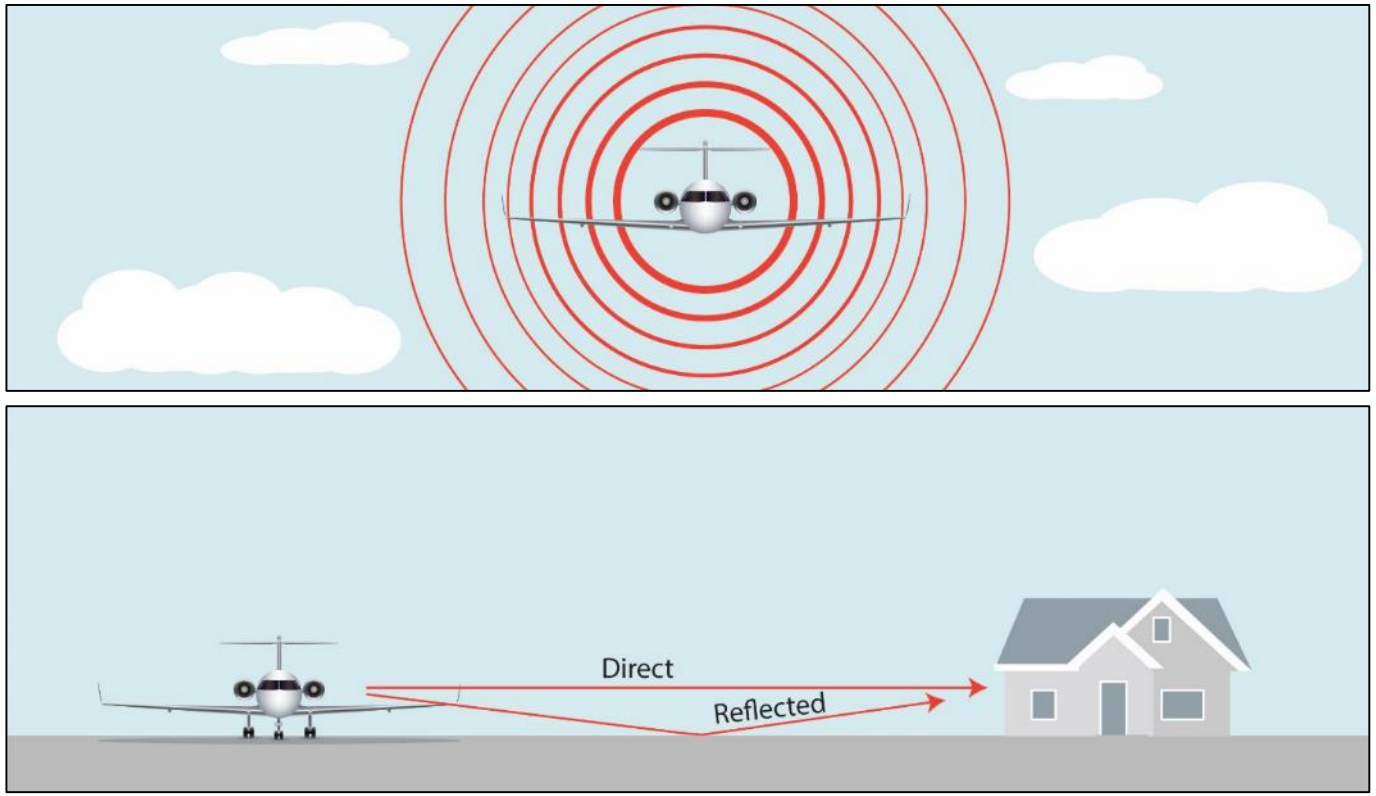


Aircraft Noise Effects on Human Activity

- Speech interference may occur
  - Outdoors with sound levels of 60 – 65 dBA outdoors or higher
  - Indoors with windows open at sound levels of 70 – 75 dBA outdoors or higher (outdoor to indoor level reduction is approximately 15 dB with open windows)
  - Indoors with windows closed at sound levels of 75 – 80 dBA outdoors or higher (outdoor to indoor level reduction is approximately 25 dB with closed windows)
- Sleep interference may occur for ~ 2 % of people
  - With windows open and exterior sound levels of 70 to 75 dBA, Lmax
  - With windows closed and exterior sound levels of 80 to 85 dBA, Lmax

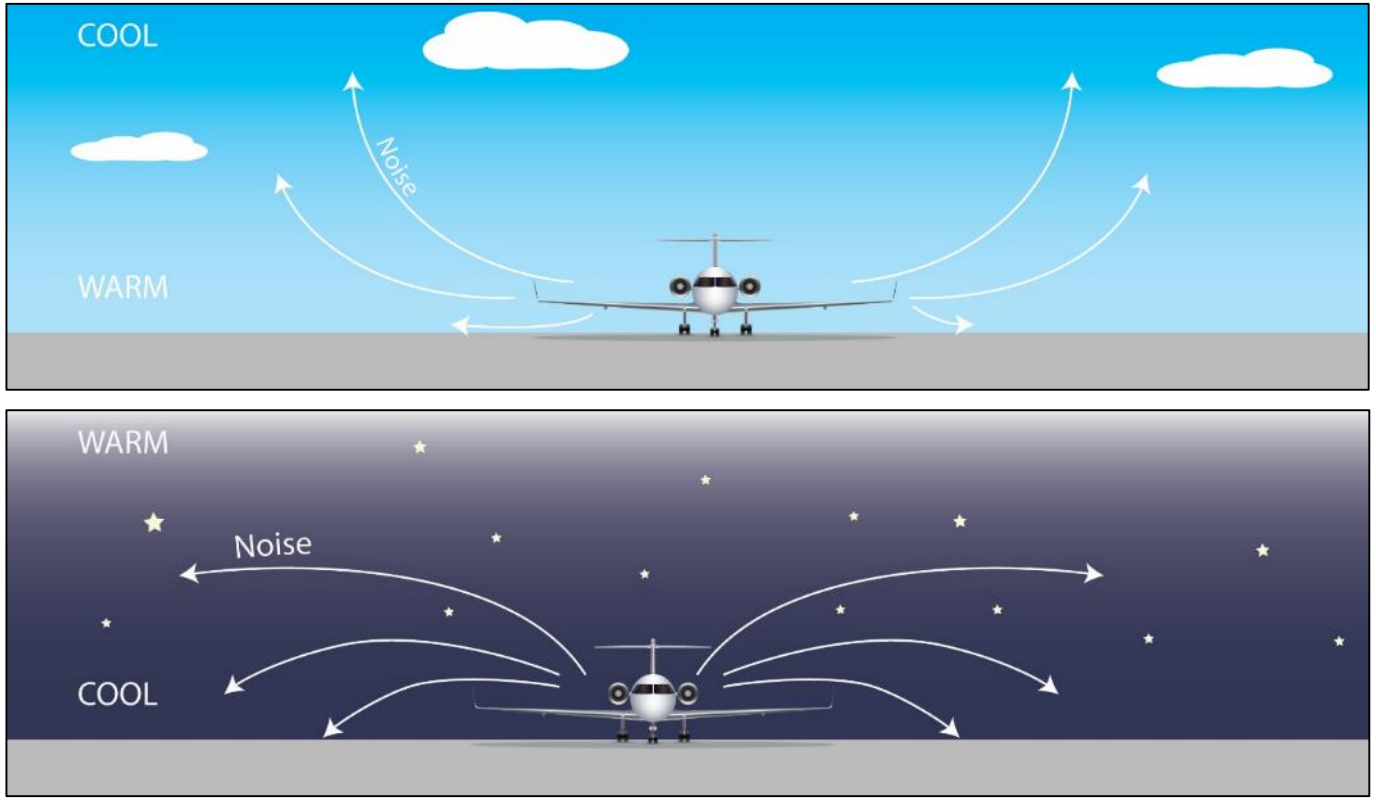
Sound Propagation

- Spherical Spreading
  - Sound level decreases by 6 dB per doubling of distance
  - Additional losses due to atmospheric absorption
- Ground Effect
  - Sound levels are lower when reflected off of soft ground vs. hard ground



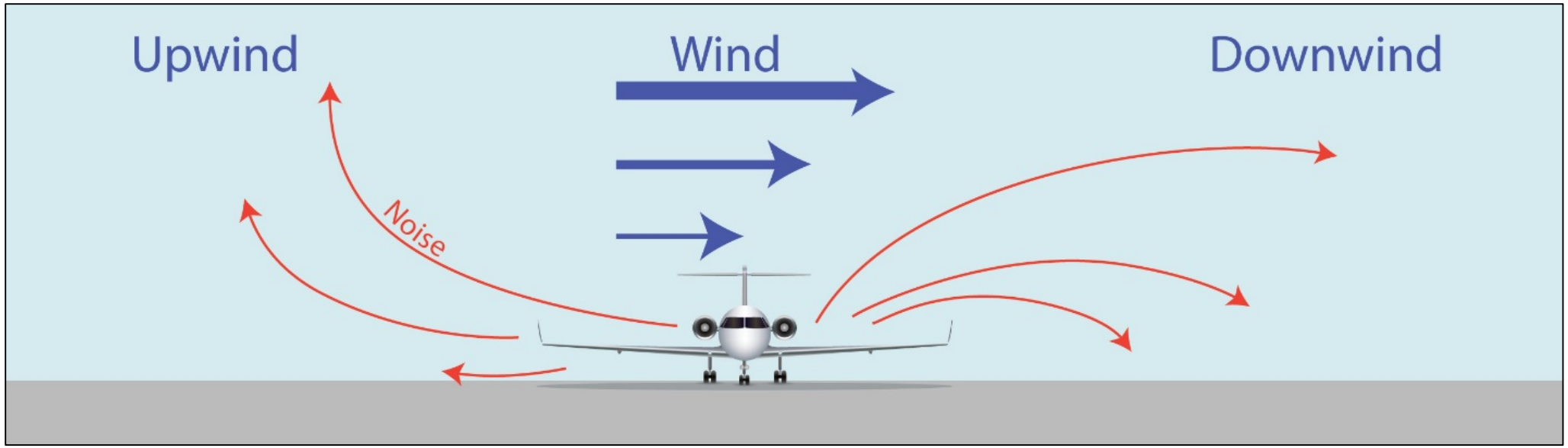
Sound Propagation

- Refraction due to Temperature
  - Gradients in temperature cause the bending of sound paths
  - Sound bends upward during a temperature lapse (cool air over warm)
  - Sound bends downward during a temperature inversion (warm air over cool)



Sound Propagation

- Refraction due to Wind
  - Gradients in wind speed cause the bending of sound paths
  - Sound bends upward causing sound shadows in the upwind direction
  - Sound bends downward increasing sound levels in the downwind direction
  - Differences between upwind and downwind directions can be 20 dB



Ground Noise Study Scope

- Ground Noise Data Research
  - Meet with StART
  - Identify ground noise sources and locations
  - Identify atmospheric conditions that may increase ground noise
- Noise Monitoring
  - Obtain and analyze data from permanent monitors
  - Collect and analyze additional temporary noise monitoring data
- Identify Mitigation Options
  - Present findings on ground noise sources and levels and solicit input on mitigation measures
  - May include changes in aircraft operating procedures or utilization of new or existing structures to reduce community noise exposure
- Report Project Results

Aircraft Ground Noise Sources Discussion

- Taxi/Idle
- Auxiliary Power Units (APUs)
- Engine Maintenance Run-ups
- Ground Service Equipment
- Reverse Thrust

Noise Monitoring Discussion

- Locations
- Times of Day

Thank you for your input