# Noise Certification of Emerging Technology Aircraft

Presented To: Drone Enable 2022

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Federal Aviation Administration

# Questions Regarding Noise Certification & Environmental Review

- Which vehicles should require noise certification?
- What procedures should be used? (i.e. operating profiles, altitude and speed, microphone types and placement, etc.)
- What noise metrics and limits are appropriate?
- How should FAA approach the noise analysis for Environmental Review?
- What data are to be collected and what modeling tool(s) need to be updated/developed to support modeling for environmental review?

Data collection
Measurement procedures
Modeling methods & tools
Quiet design & operations
Standards and policies

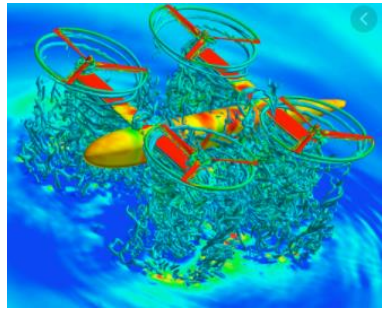
# Aircraft Noise Certification

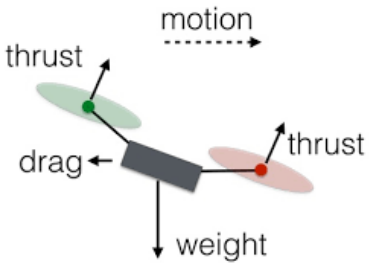
***Noise Certification is the primary means of controlling aircraft noise at the source***

- ICAO Annex 16 Vol I is recognized worldwide as the primary aircraft noise certification standard
- 14 CFR Part 36 is the U.S. equivalent
- FAA is the Certificating Authority in the U.S.
- Office of Environment & Energy (AEE) is responsible for aircraft noise certification regulations, with the certification offices implementing the certification

# Noise Certification for UAS

- Limited in “fitting” into the existing Part 36 categories and testing procedures and standards
- Statutory requirement (U.S.C. 44715) to develop a noise certification process for aircraft
- Long term: develop updated certification process informed by research to better understand unique noise characteristics and flight profiles.  Need more data to formulate key parameters!
- Interim:  certification on case-by-case basis via rules of particular applicability - RPA





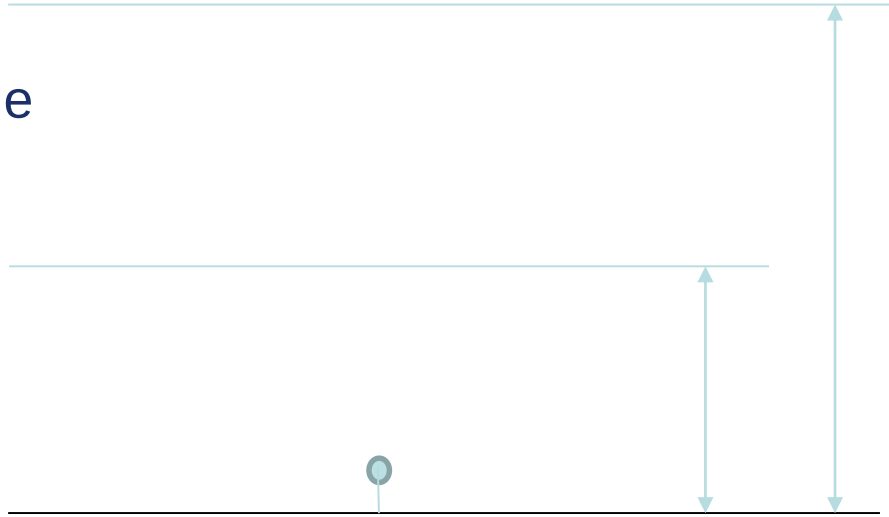
# Matternet M2 RPA: Compliance Testing – Level Flight

**Compliance test procedure – level flight**

Based on Append J of part 36:  light-weight helicopter, pole microphone & Sound Exposure Level

**Reference Altitude**

Changed from 492 ft (150m) to 250 ft (76.2m)
(signal to noise ratio, representing actual operation)



**Reference speed**

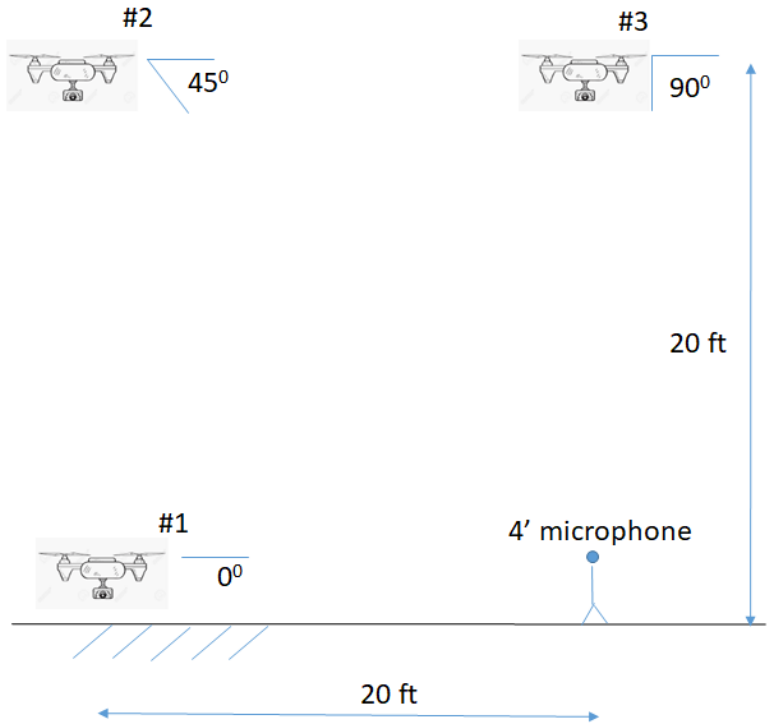
Max speed at empty weight and cruise speed at max takeoff weight

**Noise limit**

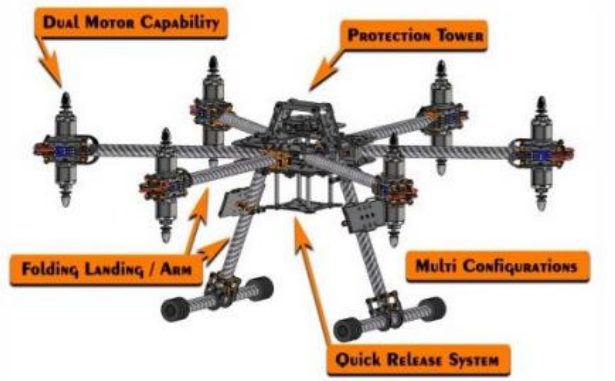
# Matternet M2 RPA:  Supplemental Noise Testing - Hover

Not part of compliance measurement and no noise limit.  FAA seeks to collect noise data for UAS capable of hovering to inform future standards

Test designed to use the same equipment (single 4 ft. mic) and single microphone location



# FAA Noise Research on UAS





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Volpe Acoustics
Unconventional Aircraft Noise Research Team

BRRC
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RESEARCH AND CONSULTING

# FAA Partners/Collaborations

## NASA UAM Noise Working Group

NASA/TP–2020-5007433

Urban Air Mobility Noise: Current Practice, Gaps, and Recommendations


*Stephen A. Rizzi, Langley Research Center, Hampton, Virginia*
*Dennis L. Huff, Glenn Research Center, Cleveland, Ohio*
*D. Douglas Boyd, Jr., Langley Research Center, Hampton, Virginia*
*Paul Bent, Boeing R&T, St. Louis, Missouri*
*Brenda S. Henderson, Glenn Research Center, Cleveland, Ohio*
*Kyle A. Pascioni, Langley Research Center, Hampton, Virginia*
*D. Caleb Sargent, Sikorsky Aircraft, Stratford, Connecticut*
*David L. Josephson, Josephson Engineering, Santa Cruz, California*
*Mehmet Marsan, Federal Aviation Administration, District of Columbia*
*Hua (Bill) He, Federal Aviation Administration, District of Columbia*
*Royce Snider, Bell Flight, Ft. Worth, Texas*



NASA AAM National Campaign
- Joby (pre cert) noise testing in 2021

# Concluding Remarks

- RPA used as an interim approach for noise certification
- RPA provides learning opportunities & flexibility while meeting noise certification needs
- General rules on UAS/UAM noise certification are to be developed
- Ongoing in parallel: FAA R&D programs and collaboration with NASA and others