

# UAS noise certification

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The National Transportation Systems Center



U.S. Department of Transportation

Office of the Secretary of Transportation

John A. Volpe National Transportation Systems Center



# How are crewed aircraft certificated?

## ❑ Fixed wing aircraft

- CFR Title 14, Part 36, Appendix A and B – Transport and jet airplanes
- Appendix G – small propeller-driven airplanes

## ❑ Rotary wing aircraft

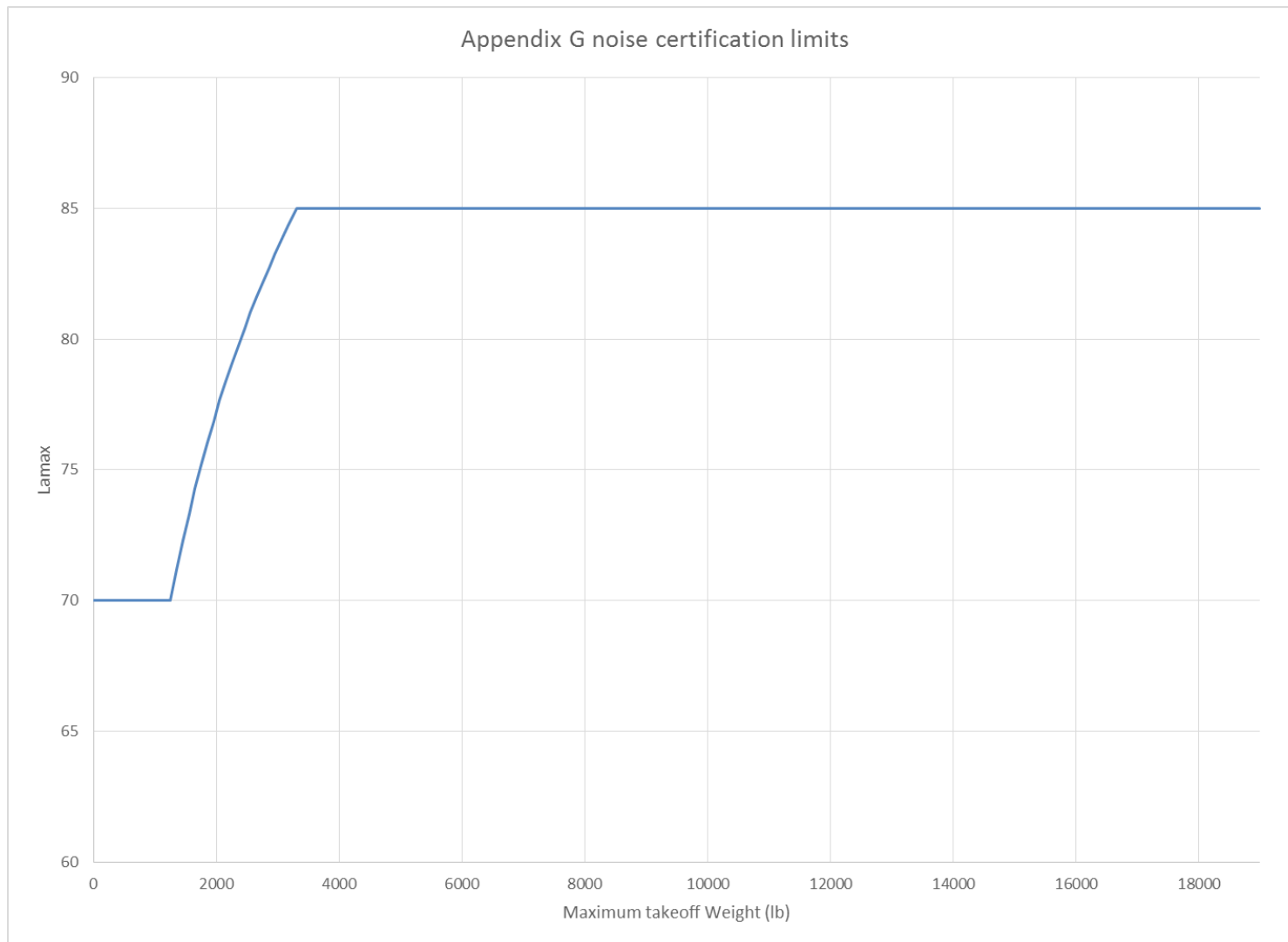
- Appendix H – above 7,000 pounds
- Appendix J – below 7,000 pounds



## ❑ Tilt-rotor aircraft

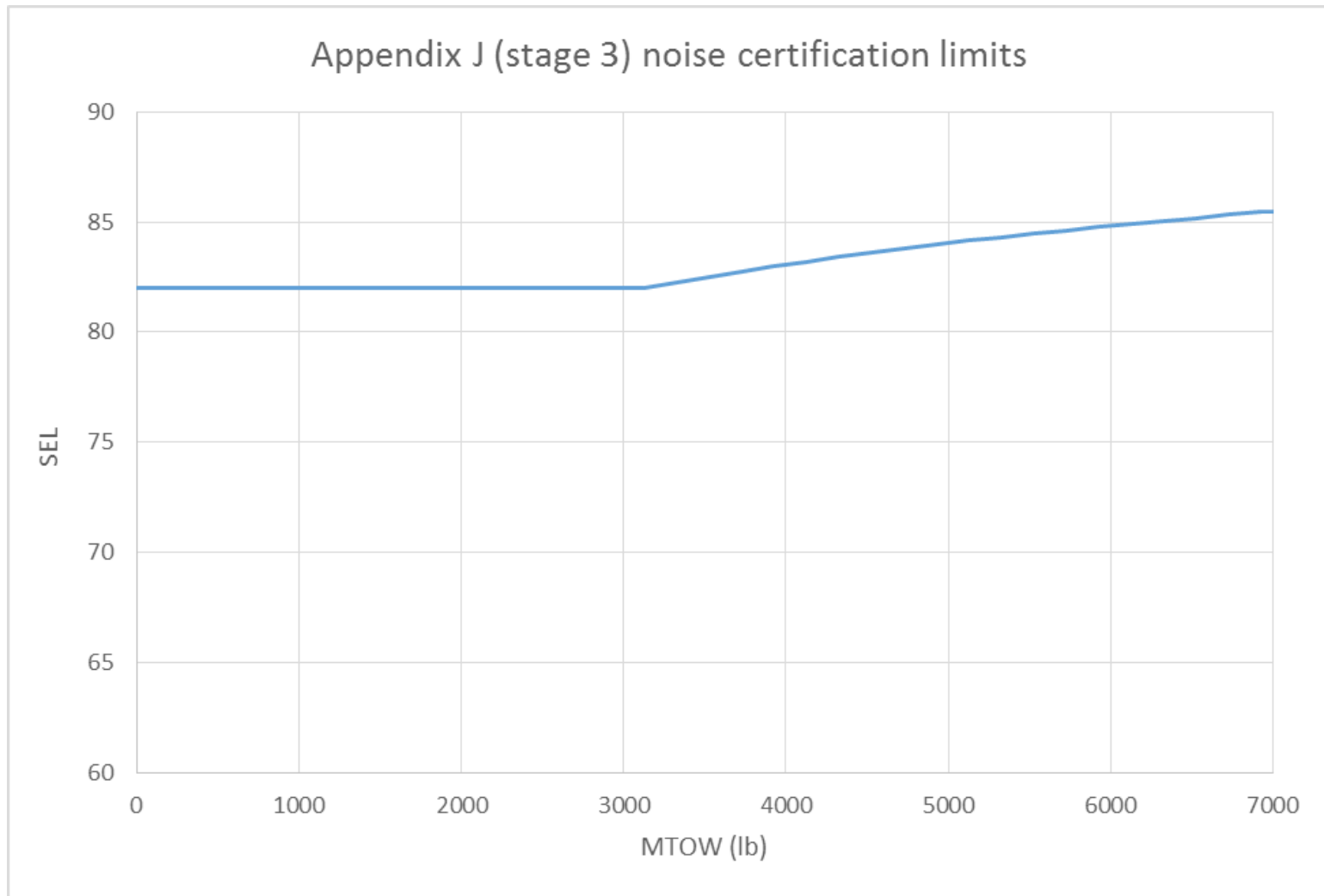
- Appendix K

# UAS Certification



CFR Title 14, Part 36, Appendix G

# UAS Certification



CFR Title 14, Part 36, Appendix J

# UAS Appendix G Measurement setup

## □ Ground-plate setup:

- Microphones were placed at  $0.75r$  from the center of the plate along a radius normal to the UAS flight direction as described in 14 CFR Part 36 appendix G



# UAS Noise certification test example

- ❑ Appendix G certification test of Navmar TigerShark
  - Test conducted at Griffiss Airport in Rome, New York
  - May 17, 2016
  - Supported by Navmar, Northeast UAS Airspace Integration Research Alliance, Mississippi State University

## Objectives:

- Determine noise levels of a middle weight (400 lb) UAS
- ❑ Aircraft does not meet noise certification requirements





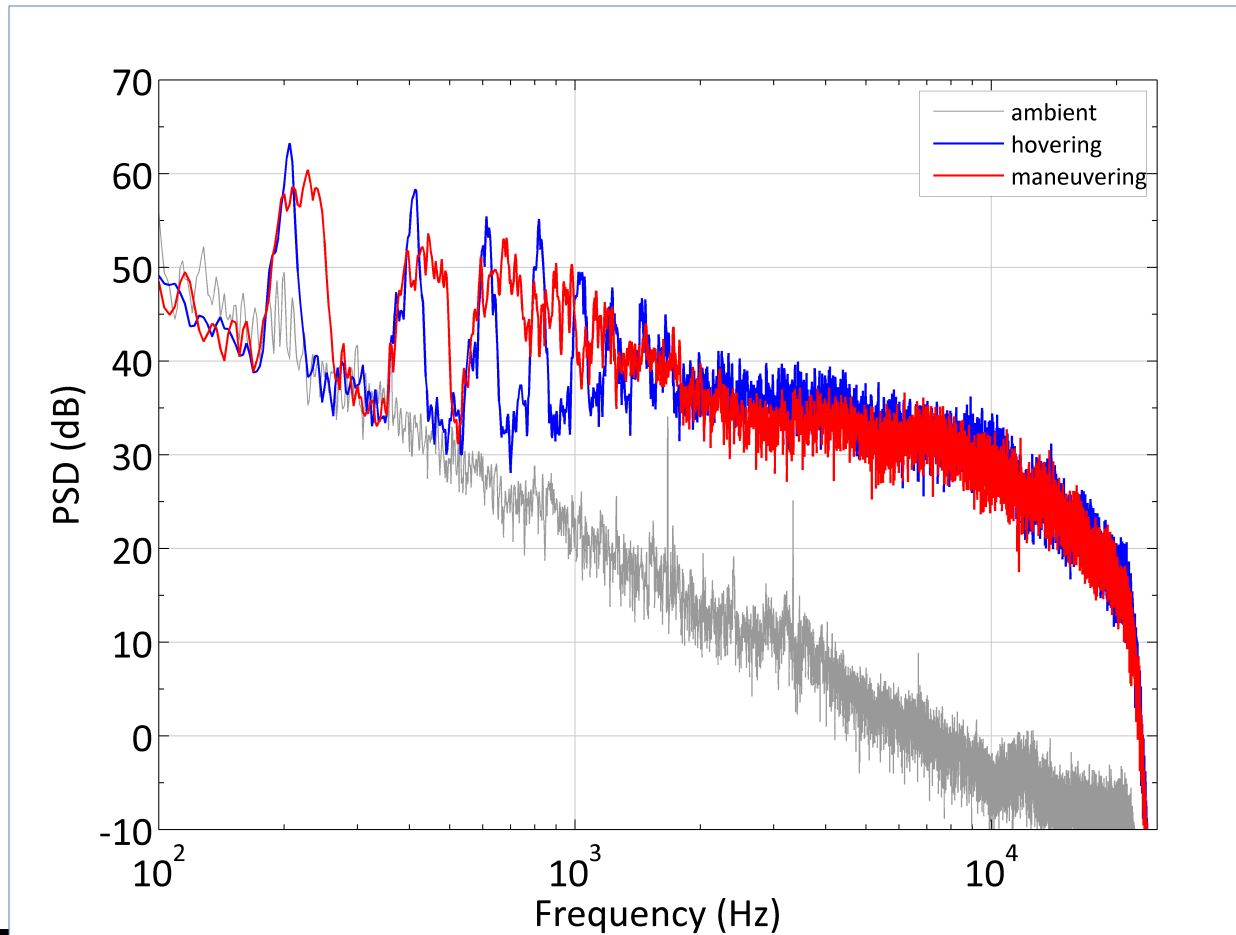
# UAS noise measurements

	UAS type	Weight (lb)	Operation	Microphone configuration	Lamax @ 400'	Data quality
AeroVironment PUMA	Fixed wing	13.4	Takeoff	IGPM	37.9	Cert
Insitu Scan Eagle	Fixed wing	46	Takeoff	IGPM	57.8	Cert
Navmar TigerShark	Fixed wing	397	Takeoff	IGPM	90.8	Cert Quality
Navmar TigerShark	Fixed wing	397	Level overflight	Pole	84.9	Cert Quality
Edge 540	Fixed wing	25	Level overflight	MOP	53.4	Research
DJI Phantom 2	Quadcopter	3.5	Level overflight	MOP	44.9	Research
Prioria Hex	Hexcopter	5.5	Level overflight	MOP	45.9	Research

IGPM: Inverted Ground Plane Microphone

MOP: Microphone on a Plate

- Flight tests at Volpe
  - Initial tests were tethered (March, April 2016)
  - Test of new instrumentation system, July 2017 (after Part 107 authority granted)





- ❑ Operations will be different from crewed aircraft
  - Potentially much closer to people
  - Potentially maneuvering much closer to people
- ❑ Numbers of operations may be different
- ❑ Possibly newly exposed populations
  
- ❑ Noise certification is intended to provide a means of comparing vehicles
  
- ❑ Noise certification is not intended to provide a means of determining annoyance or acceptability

## Next Steps

- ❑ Need to understand current sUAS operational and vehicle noise sources
- ❑ Need to understand limits to technology to minimize sUAS noise
- ❑ Need to understand human response to sUAS noise