

# Part 36 Stage Analysis

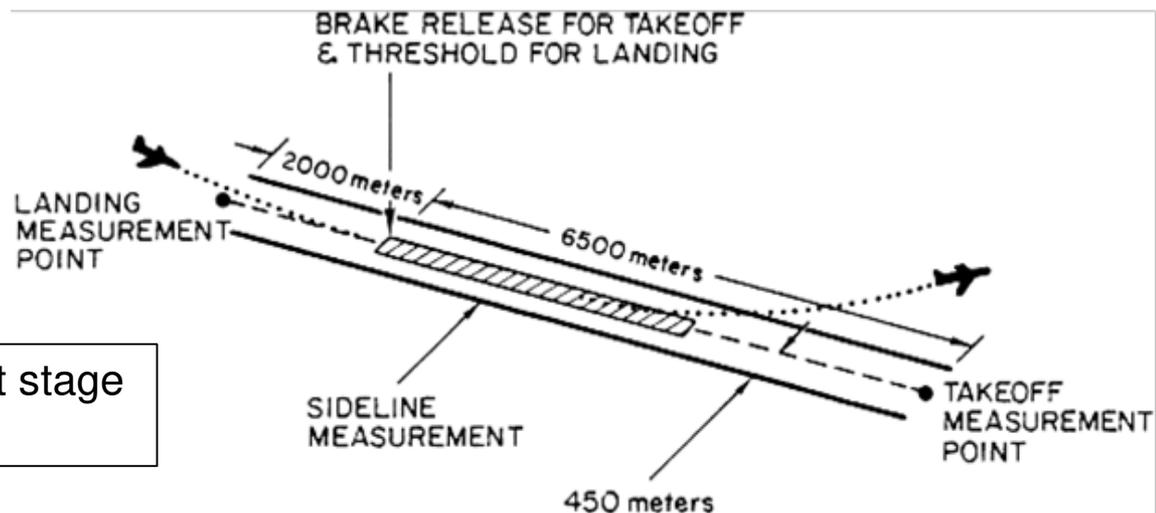


Presentation to:  
**Noise Compatibility Committee**  
April 27, 2017

# 14 CFR Part 36, Aircraft Noise Standards

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- Aircraft must meet Part 36 standards to obtain new or revised "type" or "airworthiness" certificates to operate in the U.S.
- Standards vary with "design" criteria, including (in part):
  - Type of propulsion (e.g. turbojet- or propeller-driven)
  - Weight (e.g., "small" aircraft under 12,500 pounds, and "large" aircraft)
  - Fixed-wing versus rotary-winged aircraft
  - etc.
- Certification for jets is based on three measurements
  - Landing
  - Sideline
  - Takeoff



Locations can vary with aircraft stage and number of engines.

# Evolution of Jet Part 36 “Stages”

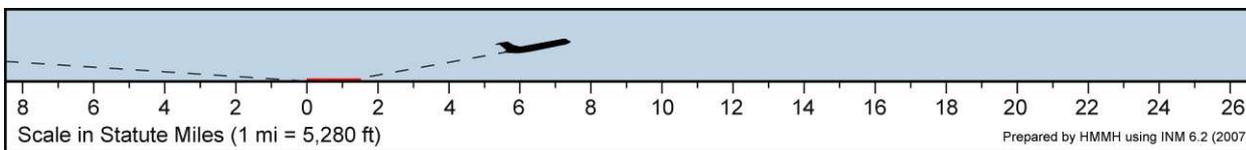
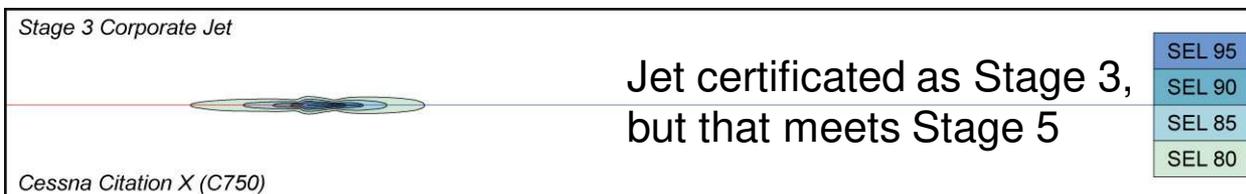
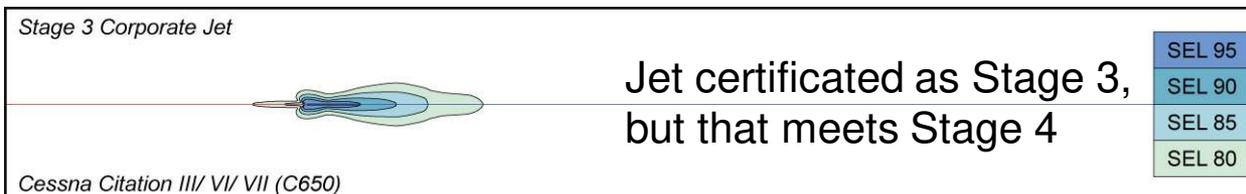
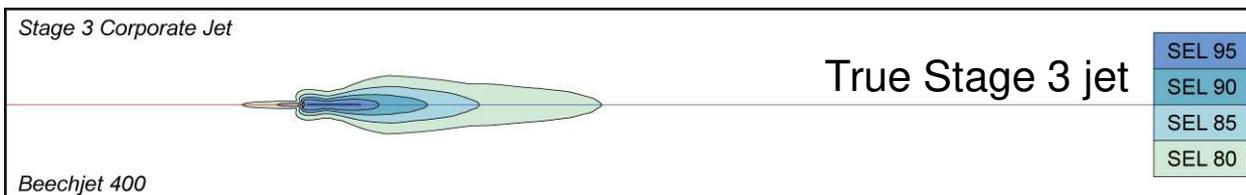
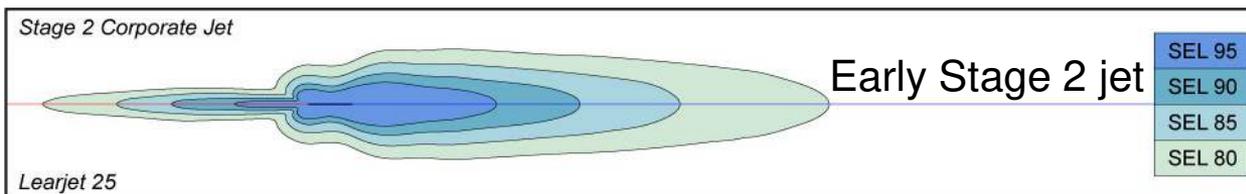
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- **1969: Established initial Part 36 standards**
  - Aircraft were “certificated” or “uncertificated” – no “stages”
- **1977: Increased stringency of limits *and introduced stages***
  - “Stage 1” aircraft have never been shown to meet any noise standards
  - “Stage 2” aircraft meet original noise limits, set in 1969
  - “Stage 3” aircraft meet more stringent limits, established in 1977
- **2006: Added Stage 4**
  - Cumulative 10 EPNdB below Stage 3 limits across all three measurement locations (in any combination)
- **There is an ICAO proposal for a “Stage 5” standard that is:**
  - 7 dB quieter than Stage 4, 17 dB quieter than Stage 3
  - Would apply to jet aircraft at the following dates:
    - Aircraft weighing over 55 metric tonnes (approx. 120,000 lbs.) in 2018
    - Lighter aircraft not until 2021 (i.e., effective date for aircraft that use APF)
- **Stage 2 jets banned at APF in 2002, nationwide in 2016**
  - *There are no phase outs proposed for Stages 3 or 4*

# Part 36 Stages

## Comparisons of Single Event Level Graphics

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# Analysis of January – March 2015 APF Jet Operations

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- Data obtained from Exelis “ADS-B ground-station” data feed
- Of the 8,367 identified jet operations:
  - An estimated 6,446 (77%) are certified as Stage 3
  - An estimated 1,921 (23%) are certified as Stage 4
- However, we estimate the great majority – 5,614 or 67% – *actually meet the proposed Stage 5 standards*
  - 1,457 (17%) meet Stage 4 standards
  - A small minority (1,307 or 16%) meet only Stage 3 standards.
- *Most aircraft are formally certified at a lower stage than they actually would achieve if certificated under today’s rules.*
- *On an overall average basis, we estimate jets operating at APF in the first quarter of 2015 were 25 dB below Stage 3 standards – 8 dB below even the proposed Stage 5 standards!*