Making Aircraft Quieter

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Steady Progress In Noise Reduction

ICAO Symposium on Aviation and Climate Change, "Destination Green", ICAO Headquarters, Montréal, Canada, 14 - 16 May 2013

Cumulative Margin Relative to Chap. 3

ICAO Standards

Chapter 2

Chapter 3

Chapter 4

Chapter 14

Current Technology Future Technology

*ICAO data

Year of Certification

Noise in Perspective

1960s Airplane: 120-130 dBA
Lawn Mower: 110 dBA
Urban: 85-90 dBA
Normal Speech: 60-70 dBA
Threshold of Hearing: 0-10 dBA

Rock Band: 110 dBA
High Speed Train: 85 dBA
Office: 60 dBA
Public Library, Whisper: 30 dBA

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Community Noise Reduction: Much Achieved

- Turbojet (1960): 707
- First-generation turbofan (1965-70): 727
- Advanced design (1994): 777
- Current design: 787

85 dBA takeoff noise contours

![Noise Contours](image-url)
Community Noise Reduction: More to Come

1990’s Narrow Body

2014-16 Narrow Body

¾ Area Reduction
Aircraft Noise
Making It & Hearing It

Making Less Noise
- Lighter airplanes at same capability
- Higher bypass ratio engines
- Noise reduction technologies

Hearing Less Noise
Keeping your distance
Increasing aircraft height
More Efficient Aircraft Deliver Significant Noise Reduction

Cumulative Noise Level

Chapter 3 Limit

1970s Technology

20 dB

Chapter 4 Limit

4 EPNdB Margin

1990s Technology

Chapter 14 Limit

3 EPNdB Margin

2010s Technology

2X Passengers

3X Range

2010s Technology at Comparable Capacity

* EPNdB = Cumulative Metric for Noise Certification
Continuous Descent Arrival (CDA) 
Staying Higher, Longer 
Reduces Fuel & Noise

747-400 
65 dBA Contours

37% reduction

Source: The Boeing Company, 2013
Propulsion System Optimization

Fan Diameter (Bypass Ratio)

Fuel Burn

Noise

Current Technology

Advanced Technology

Higher

Lower

Fan Diameter (Bypass Ratio)
Larger, Slower Fans Reduce Noise
Noise Reduction Technology Examples

- Chevron Nozzles
- Engine Internal Features
- Wing Leading Edge
- Landing Gear
Summary

• New aircraft are very quiet

• Even quieter aircraft coming

• All aspects of a balanced approach are important