

# The History of DNL 65 and Implications for Future Noise Policy



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# Topics We'll Cover

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- **What is DNL? Why was it adopted as noise measure of choice?**
- **How was 65 dB selected as threshold of significance and land use compatibility?**
- **What has changed since then?**
- **What are implications for policy?**

# Boeing 727 “WhisperJet”

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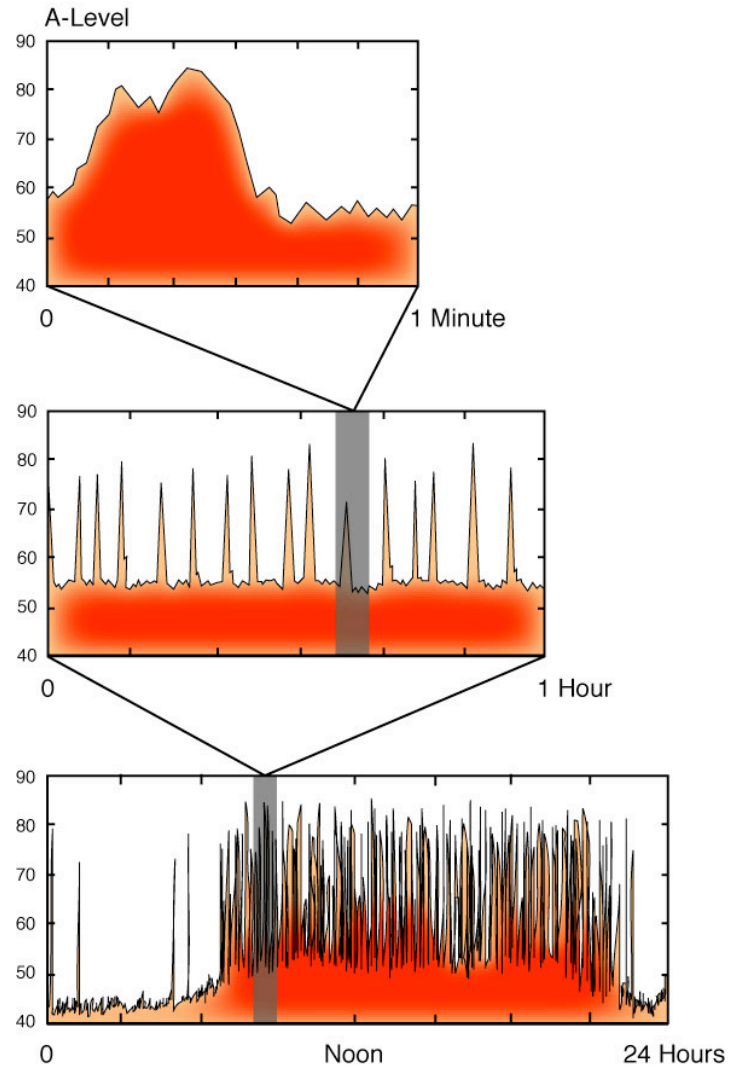


**Boeing 727-200™**  
**Eastern (1977) N8871Z**  
*Limited Edition (696 Models)*



# Day-Night Average Sound Level

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# History of Adoption of DNL 65

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- **1969 National Environmental Policy Act**
- **1969 California: California Statutes, Ch 1585**
- **1972 U.S. EPA and HUD: Noise Control Act of 1972**
- **1974 Maryland: MD Environmental Act of 1974**
- **1976 FAA Noise Policy**
- **1979 Aviation Safety and Noise Abatement Act**

# History of DNL 65: NEPA

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- NEPA requires each Federal agency to disclose to the interested public a clear, accurate description of potential environmental impacts that proposed Federal actions and reasonable alternatives to those actions would cause.
- “identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations”

# History of DNL 65: California

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- **1969: Public Utilities Code §21669**
  - “The department shall adopt noise standards governing the operation of aircraft and aircraft engines for airports”
  - “based upon the level of noise acceptable to a reasonable person residing in the vicinity of the airport.”
  - “Due consideration to economic, technical feasibility”
  
- **Recommendations**
  - DNL 65 judged as threshold of complaints
  - Report strongly recommended periodic review of standard in light of new research, minimum every five years

# History of DNL 65: Noise Control Act

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## ■ 1972: Noise Control Act

- Study “implications of identifying and achieving levels of cumulative noise exposure around airports” and provide “information on the levels of environmental noise requisite to protect the public health and welfare with an adequate margin of safety.”

## ■ Results of 1972 Noise Control Act

- Recommendation of DNL as appropriate metric
- “To achieve an environment in which no more than 20% of the population are expected to be highly annoyed and no more than 2% actually to complain of noise, the outdoor day-night average sound level should be less than 60 decibels.”
- DNL 55 “level of environmental noise requisite to protect the public health and welfare with an adequate margin of safety”

# History of DNL: Maryland

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- **1974: Maryland Aviation Noise Policy**
  - Model for Part 150
  - Balance environmental goals with technical and economic feasibility

# History of DNL: Maryland

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- **1974: Maryland Aviation Noise Policy**
  - Model for Part 150
  - Balance environmental goals with technical and economic feasibility
- **Recommendations:**

Land Use	Limits for Cumulative Noise Exposure Day-Night Average Sound Level, dB	
	Effective 1 July 1975	Effective when U.S. Fleet is 5dB below July 1975 level
Residential – Single, Multi-Family, Schools, etc.	65	60

# History of DNL 65: FAA Noise Policy

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- **1976: FAA Noise Policy**
  - Recognized need for balance between what is desirable and what is achievable
  - “goal of confining severe aircraft noise exposure levels around U.S. airports to the areas included within the airport boundary or over which the airport has a legal interest, and of reducing substantially the number and extent of areas receiving noise exposure levels that interfere with human activity.”

# History of DNL 65: FAA

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- **1979: Aviation Safety and Noise Abatement Act (ASNA)**
  - Establish “a single system of measuring noise”
  - Establish “a single system for determining the exposure of individuals to noise resulting from airport operations, including noise intensity, duration, frequency, and time of occurrence”;
  - “Identify land uses normally compatible with various exposures of individuals to noise”
- **Result**
  - FAR Part 150, with guidelines: DNL 65 “normally compatible” with residential land use

# Aviation Safety and Noise Abatement Act

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- **TITLE 49--TRANSPORTATION SUBTITLE VII--AVIATION PROGRAMS PART B--AIRPORT DEVELOPMENT AND NOISE CHAPTER 475--NOISE SUBCHAPTER I--NOISE ABATEMENT Sec. 47502. Noise measurement and exposure systems and identifying land use compatible with noise exposure After consultation with the Administrator of the Environmental Protection Agency and United States Government, State, and interstate agencies that the Secretary of Transportation considers appropriate, the Secretary shall by regulation-- (1) establish a **single system of measuring noise that-- (A) has a highly reliable** relationship between projected noise exposure and surveyed reactions of individuals to noise; and (B) is applied uniformly in measuring noise at airports and the surrounding area; (2) establish a single system for determining the exposure of individuals to noise resulting from airport operations, including noise intensity, duration, frequency, and time of occurrence; and (3) identify land uses normally compatible with various exposures of individuals to noise.**

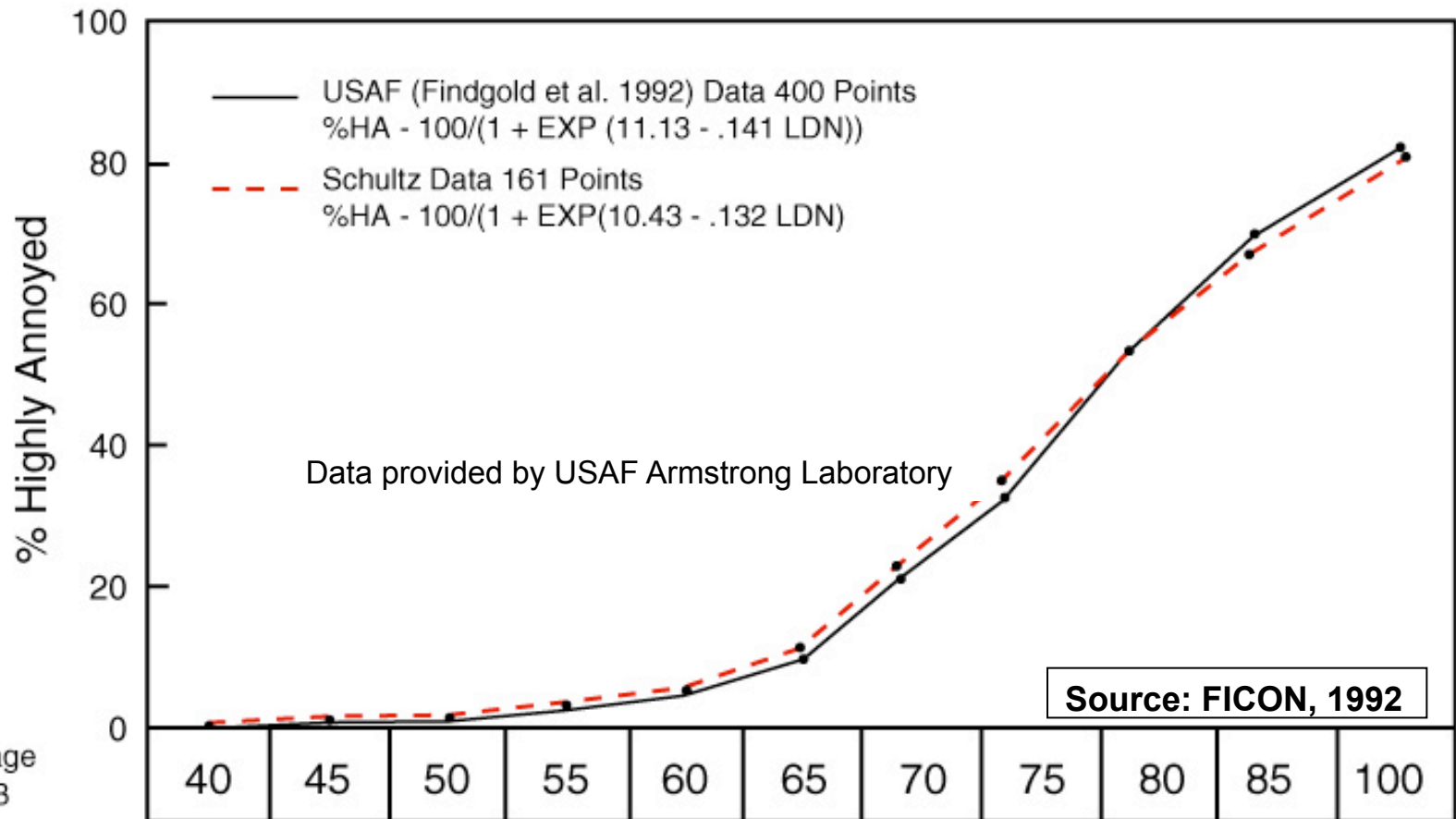
# Part 150 Table 1: Land Use Compatibility with Yearly Day-Night Average Sound Levels

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Land Use	Yearly Day-Night Average Sound Level, DNL, in dB					
	<65	65-70	70-75	75-80	80-85	>85
Residential other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home park	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail--building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade--general	Y	Y	Y(2)	Y(3)	Y(4)	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y

# The Schultz Curve: basis for current policy

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Day - Night Average Sound Level in dB

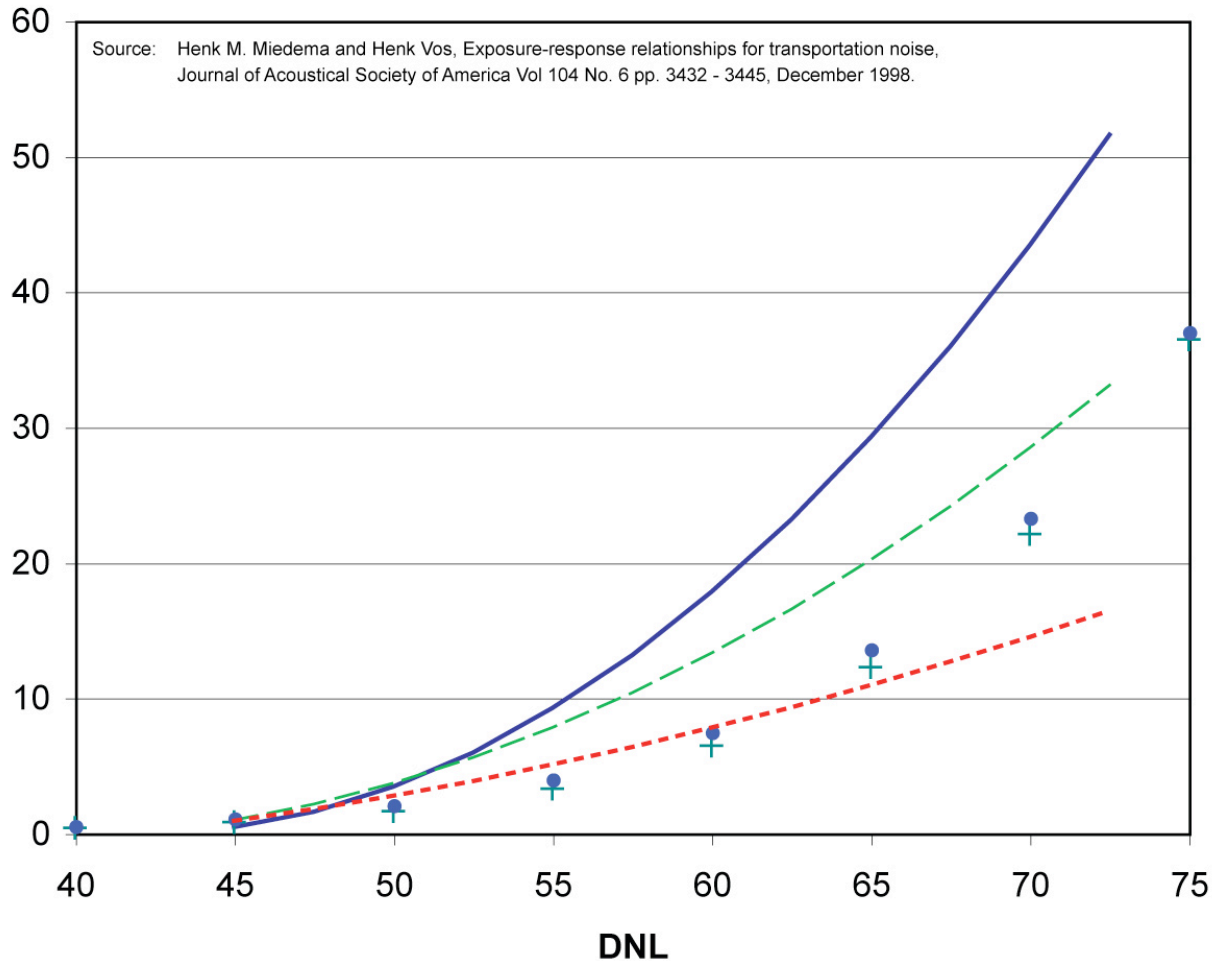
Calculated % HA Points

USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

# Annoyance differs by transportation source

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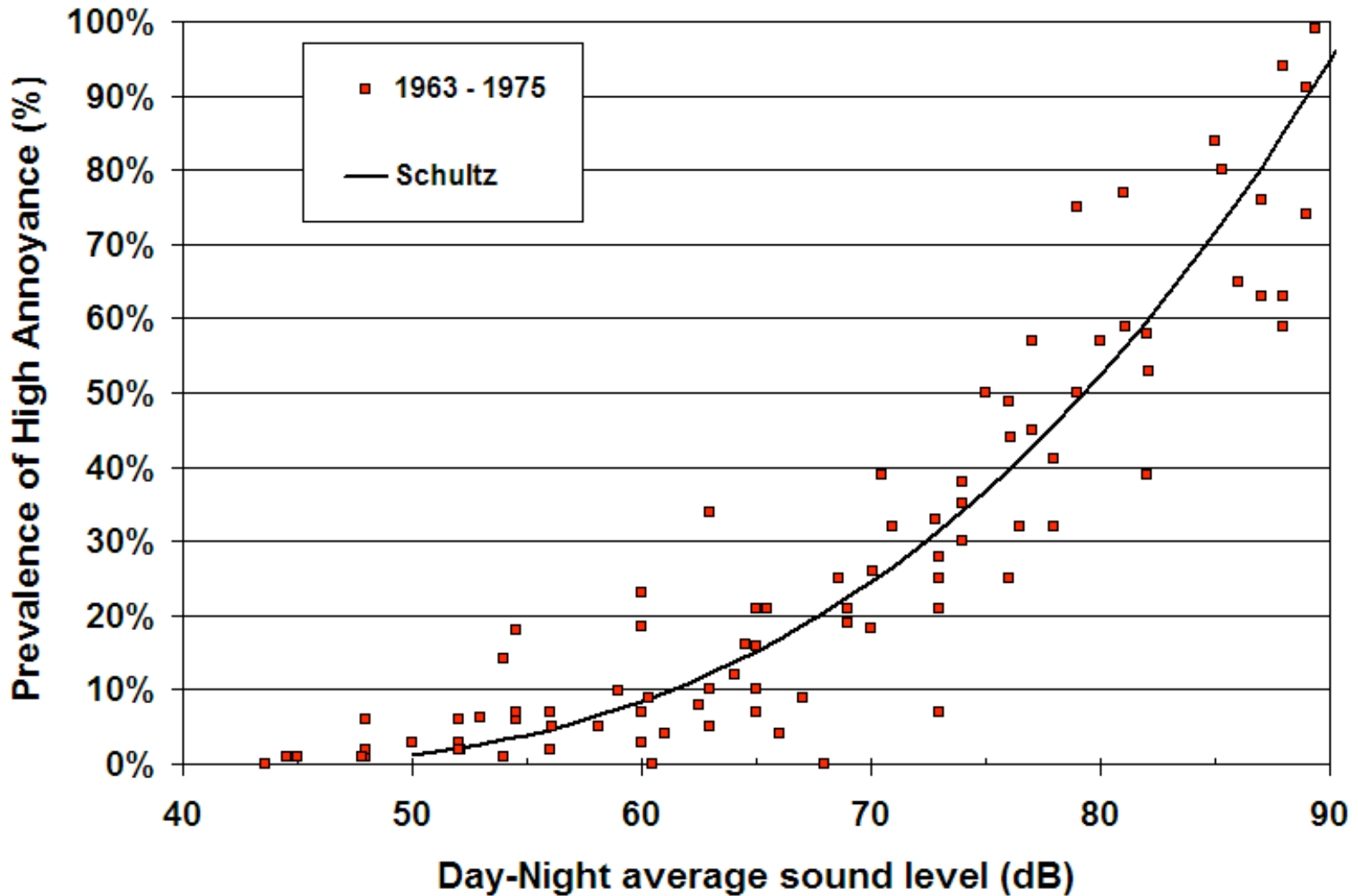
DNL vs. %HA according to Miedema and Vos (1998)



- Aircraft- multilevel model
- - - Road Traffic- multilevel model
- - - Rail- multilevel model
- + USAF (1992) (From FICON 1992)
- Shultz (From FICON 1992)

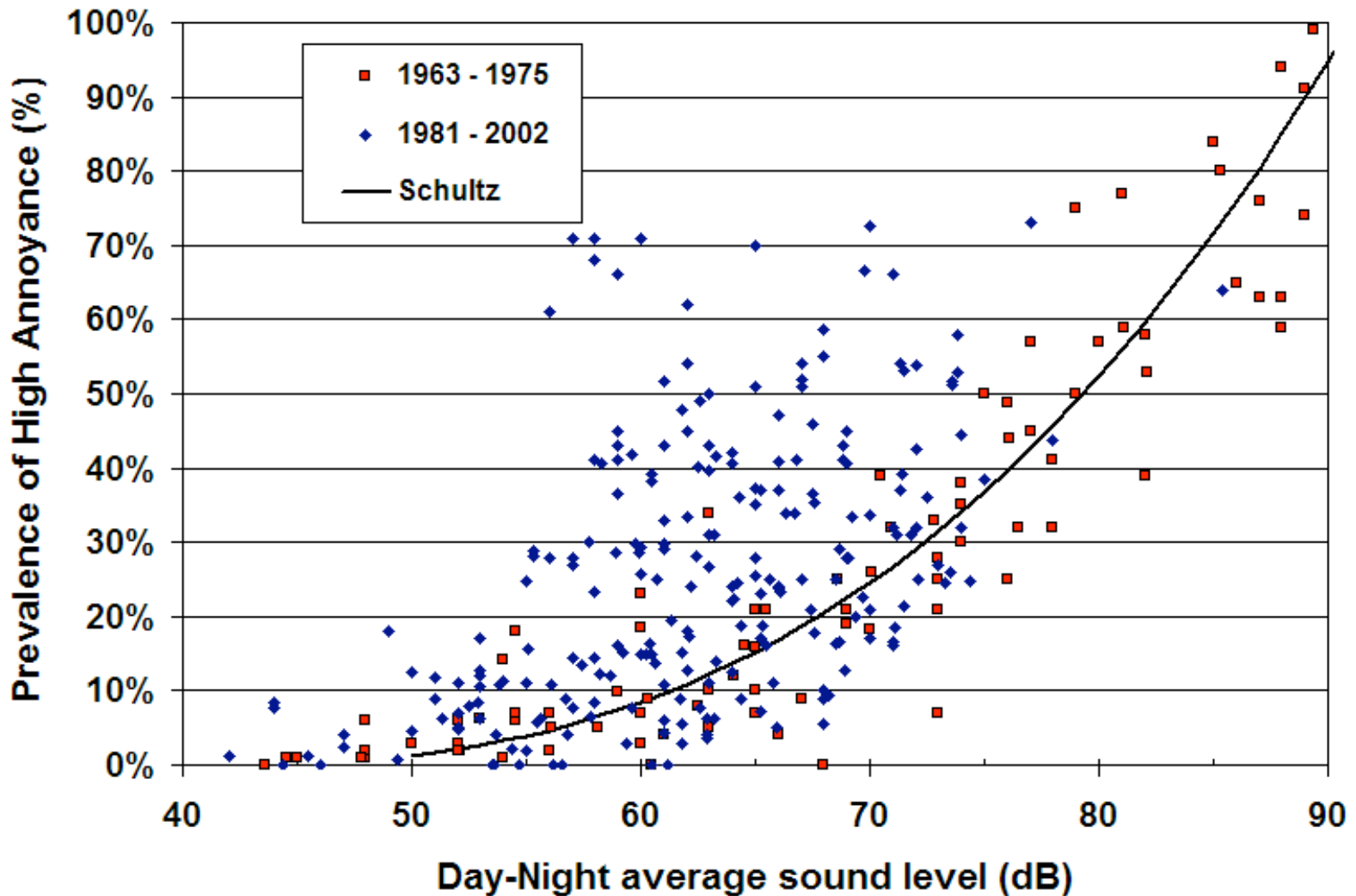
# Aviation studies only (original Schultz data)

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# Aviation studies only (with new data)

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- **Does Schultz curve still represent “best available science”?**
- **Is it “highly reliable”?**
- **Is DNL still the best metric?**
- **Is DNL 65 still an appropriate threshold of land use compatibility?**
- **What about for evaluating other effects other than land use compatibility?**
- **What is value of Part 150 if restricted to only land uses within DNL 65?**

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