



Noise Certification Workshop

Session 2: Aircraft Noise Certification Harmonisation

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Harmonisation / The Beginning

→ In June 1990 at a meeting of the JAA Council and the FAA, the FAA Administrator committed the FAA to support the harmonisation of the U.S. regulations with the Joint Aviation Regulations (JAR).

Harmonisation / ARAC

- In January 1991 FAA established the Aviation Rulemaking Advisory Committee (ARAC) to serve as a forum for the FAA to obtain input from outside the government on major regulatory issues facing the agency.

Harmonisation / The ARAC process...

- Was industry led;
- Task group membership was by invitation and consisted of experts drawn from industry and authorities;
- Groups met in closed session; but
- Recommendations were presented to ARAC Council in public forum before being forwarded to FAA for consideration.

Harmonisation / The Task

- The FAA tasked ARAC with noise certification issues. These issues involve:
 - the harmonisation of FAA Part 36 with JAR 36;
 - the harmonisation of associated guidance material including equivalent procedures; and
 - interpretations of the regulations.

Harmonisation of Part 36 with JAR 36 or Annex 16?

- The initiative was to harmonise FARs with JARs.
- The publication of JAR 36 gave FAA the incentive to harmonise FAR 36 with JAR 36
- JAR 36 is irrevocably linked with Annex 16.
- ...and so the effect of harmonising with JAR 36 was to harmonise with Annex 16.
- Any change to JAR36 could only be made after a change to Annex 16.

Harmonisation / ARAC Task Groups

- Task groups established under ARAC on May 3, 1994 to look at....
 - Light propeller driven aeroplanes (Appendix G and Chapter 10)
 - Helicopters (Appendices H & J and Chapters 8 & 11)
 - Transport Category Large & Turbojet aeroplanes (Appendices A, B & C and Chapter 3)

Light propeller driven aeroplanes (Appendix G & Chapter 10)

- Task group identified and resolved 10 substantive differences.
- 8 differences resolved by changes to FAR 36 (2 still in rulemaking process).
- 2 differences resolved by changes to Annex 16/JAR 36.
- Part 36 amendment published October 13, 1999.

Light propeller driven aeroplanes

Substantive changes include:

- Before harmonisation FAR 36 required the microphone to be located 1.2 m above the ground.
- After harmonisation FAR 36 required an inverted ground plane microphone.

Light propeller driven aeroplanes

Substantive changes include:

- Before harmonisation FAR 36 allowed use of maximum continuous power in noise certification reference flight procedure.
- After harmonisation FAR 36 rulemaking proposal would require takeoff power throughout noise certification reference flight procedure.

Light propeller driven aeroplanes

Remaining difference...

→ Aerobatic category airplanes are required to be certificated in the U.S. under FAR 36, however, such airplanes are exempt under ICAO Annex 16.

Helicopters (Appendices H & J and Chapters 8 & 11)

- Task group identified and resolved 39 substantive differences.
- 35 differences resolved by changes to FAR 36.
- 4 differences resolved by changes to Annex 16/JAR 36.
- Part 36 amendment published June 2, 2004.

Helicopters

Substantive changes include:

- Before harmonisation the variation of EPNL with weight was required for takeoff or flyover and approach when testing below the maximum certificated weight.
- After harmonisation the variation of EPNL with weight is not required. Instead measures within a weight range of 90% to 105% of maximum certification weight is required.

Helicopters

Substantive changes include:

- Before harmonisation no anomalous wind conditions must exist before testing.
- After harmonisation no anomalous meteorological conditions (including turbulence) must exist before testing.

Helicopters

Substantive changes include:

- Before harmonisation the upper weight limit for helicopter certification under Part 36, Appendix J was 6000 lbs.
- After harmonisation the upper weight limit for helicopter certification under Part 36, Appendix J is 7000 lbs and is consistent with FAA part 27 & Annex 16 Chapter 11.

Helicopters

Substantive changes include:

- Before harmonisation the speed criteria only applied V_H (max continuous power).
- After harmonisation the speed criteria added an alternative V_{NE} (Not to Exceed).

Helicopters

Remaining differences:

→ Applicability provisions

- Sections 36.11 and H36.305 of part 36 prescribe a more lenient noise limit (Stage 1) for changes in the type design of certain helicopters; and
- Section 36.805(c) prescribes a more lenient noise limit for helicopters that the FAA finds to be the first civil version of a helicopter that was designed and constructed and accepted for operational use by an Armed Force of the United States.

Transport/Turbojet aeroplanes (Appendices A & B; Chapter 3)

- Total number of differences between FAR36/AC and Annex16/ETM was 151.
- 122 changes to Part36/AC (of which 38 are described as “substantive”).
- 25 changes to Annex16/ETM (no changes were deemed to impact stringency).
- Part 36 amendment published July 8, 2002.

Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation an aircraft had to comply with the part 36 amendment that is in effect on the date of type certification.
- After harmonisation an aircraft has to comply with the part 36 amendment that is in effect on the date of application for type certification.

Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation the minimum test temperature was set at 36°F (2.2°C).
- After harmonisation the minimum test temperature is set at 14°F (-10°C).

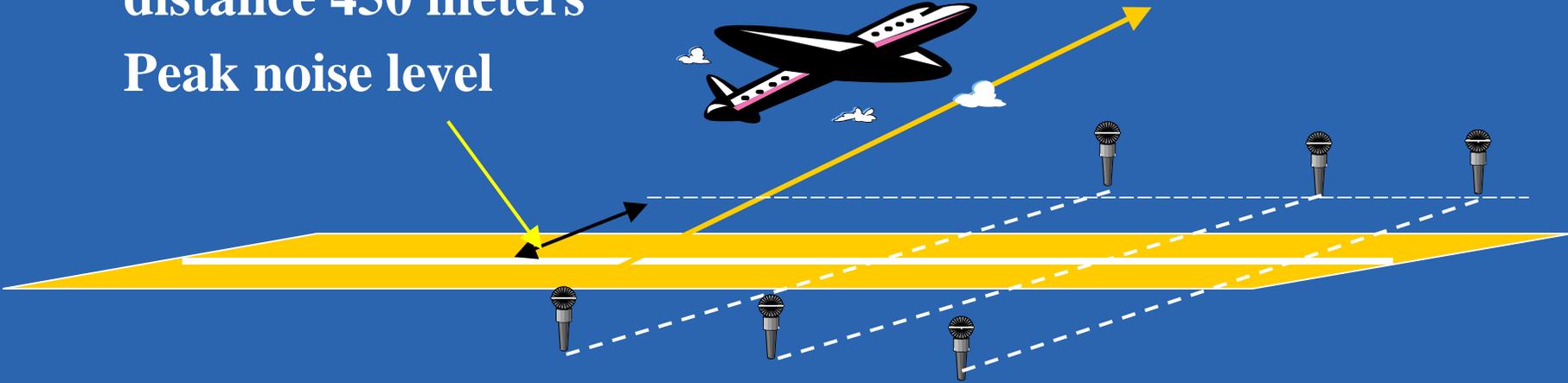
Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation for the measurement of sideline noise of propeller driven aeroplanes only one pair of microphones had to be symmetrical.
- After harmonisation symmetrical microphone positions are required at each sideline noise measurement location.

Propeller-Driven Aeroplanes Lateral Measurement Positions

Lateral reference
distance 450 meters
Peak noise level



Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation a propeller driven aeroplane had to demonstrate full power noise levels at the sideline (lateral) position.
- After harmonisation (for propeller driven aeroplanes only) an alternative full power measurement at a fixed height underneath the aircraft may be used.
- ...after March 2002 this simplified method became mandatory (for propeller driven aeroplanes).

Propeller-Driven Aeroplanes Fixed Height Lateral Measurement

Lateral reference
distance 450 meters
Peak noise level



Lateral - fixed
height procedure:
650 meters

Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation in the calculation of the reference procedure a particular “engine” was not specified.
- After harmonisation the requirements specify “average” engine thrust and define what an “average” engine is.

Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation both the flyover and lateral noise certification levels are determined using a single reference flight path that may include a thrust cutback.
- After harmonisation for tests conducted after August 7, 2002, the lateral noise level shall be demonstrated using full takeoff power throughout the takeoff flight path.

Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation the reference takeoff speed was the minimum approved value of V_2+10 knots or the all engines operating speed at 35 ft, whichever is greater.
- After harmonisation the reference takeoff speed shall be at least $V_2+ 10$ knots but not greater than V_2+20 knots.

Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation the reference approach speed was $(1.3V_S + 10)$ kts or the speed used to establish approved landing distance, whichever is greater.
- After harmonisation the reference approach speed shall be $(V_{REF} + 10)$ kts” (V_{REF} is the reference landing speed used for airworthiness certification).

Transport/Turbojet aeroplanes

Substantive changes include:

- Before harmonisation the instant in time by which a SLOW time weighted sound pressure level shall be characterized shall be the mid-point of the average period.
- After harmonisation the instant in time by which a SLOW time weighted sound pressure level shall be characterized shall be 0.75 seconds earlier than the actual readout time.

Transport/Turbojet aeroplanes

Substantive changes include:

- After harmonisation Part 36 requires that the following test parameters be reported:
 - Centre of gravity position
 - APU “ON” or “OFF”
 - Airbrake position
 - Propeller pitch angle
 - Condition of engine pneumatic bleeds and power take-offs

Transport/Turbojet aeroplanes

Remaining differences:

- Definition of wind speed.
- Procedure to correct for the effect of background (ambient) noise. (Resolved)
- Provision for design characteristics that require different reference procedures.
- Requirement for document attesting to noise certification be carried on board aircraft.

Harmonised guidance material?

- Many of the harmonisation issues were resolved via a change to the ETM.
- ETM version SGAR7 is appended to FAA Advisory Circular 36-4C.

The work continues....

ICAO CAEP Working Group 1 continues to...

- Resolve non-harmonised items
- Work on integration of ETM with AC.

The outcome of all this effort will be to facilitate mutual recognition of FAA and ICAO (i.e. JAA, EASA) approvals.

