



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject:

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Change:

ESTIMATED AIRPLANE NOISE LEVELS IN A-WEIGHTED DECIBELS

- 1. Purpose.** This circular provides listings of estimated airplane noise levels in units of A-weighted sound level in decibels (dBA), ranked in descending order for the conditions and assumptions described below. This information is provided both for aircraft that have been noise type certificated under 14 CFR part 36, and for aircraft for which no such requirement currently exists.
- 2. Cancellation.** Advisory Circular 36-3F, Estimated Airplane Noise Levels in A-Weighted Decibels, dated August 10, 1990, is canceled.
- 3. Background.** 14 CFR part 36 requires the reporting of turbojet and large transport category aircraft certificated noise levels in units of Effective Perceived Noise Level in decibels (EPNdB). Many airport and other community noise analyses utilize a noise rating scale that is based upon A-weighted decibels. For this reason, A-weighted noise levels for aircraft under 14 CFR part 36 conditions have been estimated to provide a reference source for aircraft noise levels that is consistent with the many noise rating scales having A-weighted noise level as the basic measure.

4. Noise Levels.

(a) A-weighted noise levels were estimated for each airplane as they might occur during type certification tests conducted under Appendices A, B, and C of 14 CFR part 36. However, it should be specifically noted that the reported levels are estimates and do not represent actual certificated values. This is because certification data are reported to the Federal Aviation Administration (FAA) in EPNdB for large transport category airplanes and turbojet powered aircraft. Where possible, the levels in dBA were estimated from certification data. Further, since 14 CFR part 91, Section 126(c) requires turbojet powered aircraft to use minimum certificated landing flap settings, noise levels for approaches at less than maximum flaps are listed for many turbojet aircraft.

(b) Propeller-driven small airplanes and commuter category airplanes are certificated in A-weighted noise level, however the certification flight procedure differs from that used for 14 CFR part 36, Appendix C noise certification. In addition, 14 CFR part 36 does not require approach noise tests for noise certification of propeller-driven small airplanes and commuter category airplanes. Therefore, the propeller-driven small airplane and commuter category airplane noise levels contained in this circular were also estimated.

(c) The listings of the various certificated and uncertificated airplanes include tabulations of their noise levels at maximum takeoff and landing gross weights. Noise level estimates are provided at 14 CFR part 36, Appendix C positions (6,500 meters from start of takeoff roll, and 2,000 meters from the runway threshold for approach).

(d) Since the noise levels are estimated as they might occur during type certification tests conducted under Appendix C of 14 CFR part 36, these values are intended to provide a consistent basis for comparison of noise levels of major aircraft models rather than establishing absolute levels of individual aircraft. The noise levels of individual aircraft may also differ due to variations in weight and operating procedures from those used during certification. For instance, takeoff noise levels are reduced substantially as aircraft takeoff weight is reduced. Takeoff weights during normal in-service operations are often less than the maximum certificated weight. In general, for equal application of noise control technology, the lower the maximum weight of an airplane the lower the noise level. Conversely, those aircraft normally associated with high weight, long range operation and, therefore, greater productivity, have higher noise levels and will appear predominantly at the top of the list. This aspect of increasing noise levels with increasing weight is embodied in the noise type certification requirements of 14 CFR part 36. The takeoff noise level is also dependent on which operating procedures are applied. The takeoff noise level estimates in the table(s) in this Advisory circular represent full thrust conditions for some aircraft and a reduced thrust condition, as permitted by 14 CFR part 36, for other aircraft. Neither of these conditions may be representative of the in-service operation of a particular aircraft at a particular airport. Similarly, approach noise levels are given for maximum landing weight. However, as Federal Aviation Regulations require turbojet powered aircraft to use the minimum certificated landing flap setting for normal approaches rather than the maximum certificated flap setting (the configuration that is most critical from a noise standpoint), estimates of approach noise levels with reduced flap settings have been included for many of these aircraft. An asterisk (*) next to the flap setting indicates less than maximum flaps. Variations in the absolute value of the noise estimates presented in this circular, for individual flights at actual airports, will occur when operating conditions do not conform with those corresponding to noise certification. However, the FAA believes that the ranking of aircraft noise levels that occur under uniform certification conditions provides the best information currently available on the relative noisiness of airplanes over a wide variety of conditions.

(e) In addition to the Appendix 1 listing of noise levels in order of descending magnitude, this Advisory Circular also provides the same data listed by aircraft manufacturer. This list, contained in Appendix 2, is presented as a convenience in locating data on specific airplanes.

(f) While these listings provide data on a wide variety of airplane types and models within types, other specific model designations (often peculiar to just one carrier) may not be shown. Thus, for example a Boeing 727-232 is not listed, but the equivalent data for a Boeing 727-200 with the proper engine should be used. Similarly, data for a McDonnell-Douglas DC-10-30 should be used for other models of the DC-10-30 series of aircraft.

(g) The FAA's Integrated Noise Model (INM) computer program may be useful in providing more detailed noise predictions for aircraft as they are actually flown. Further, the INM can provide predictions of noise levels at other locations which may be of greater interest to a particular community.

5. Noise Level Estimation Procedure.

Noise level estimation procedures utilized in this revision are outlined below:

(a) The results of FAA noise measurement and assessment programs have been used to establish noise levels for certain aircraft. Reference note 10 identifies these aircraft.

(b) Noise levels for certain light propeller driven aircraft have been computed using primary reference data (either from Pilot Operating Handbooks or direct from the manufacturer) as input to the noise level estimation procedure outlined in Report FAA-EE-82-1. This procedure considers both propeller and engine noise components for reciprocating engine aircraft takeoff and approach operations. Noise levels estimated using this procedure are identified in this document by Reference note 11.

(c) In the case of certain general aviation jet aircraft, the appropriate maximum noise level one-third-octave frequency spectrum has been obtained from 14 CFR part 36 certification reports. The A-weighted sound level has been computed for each spectrum. Noise level estimates established using this procedure are identified by Reference note 12.

(d) The noise levels of certain other general aviation jet aircraft included in this report have been converted to A-weighted sound level from EPNL certification data using conversion factors derived for specific engine types. The details of the procedure are outlined in Report FAA-EE-82-1. Data appearing in this Advisory Circular derived using the above conversion technique are identified by Reference note 13.

(e) The noise levels of many of the large jet aircraft included in this Advisory Circular have been derived from 14 CFR part 36 certification EPNL values using the FAA INM. Data appearing in this document derived using the INM procedure are identified by Reference note 14.

(f) The noise levels of certain large jet aircraft have been derived from data provided to the FAA directly by aircraft manufacturers. Data appearing in this document derived from such sources are identified by Reference note 15.

The FAA welcomes substantive discussion on any estimate in this document. Readers are encouraged to present data and alternative assumptions which they feel provide or lead to more accurate estimates of noise levels. Any person wishing to provide input to subsequent revisions of this AC are encouraged to write the Manager, Research and Engineering Branch (AEE-110), Office of Environment and Energy, Federal Aviation Administration, 800 Independence Ave., SW, Washington, DC 20591.

6. Distribution.

Requests for additional copies of this Advisory Circular should be sent to:

**U.S. Department of Transportation
General Services Section
M-443.2
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7. Revisions. The airplane noise level listings in this Advisory Circular will be revised and updated periodically.



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