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**FINAL REGULATORY EVALUATION,  
FINAL REGULATORY FLEXIBILITY ANALYSIS,  
TRADE IMPACT ASSESSMENT, AND UNFUNDED MANDATES**

**NOISE CERTIFICATION STANDARDS FOR  
SUBSONIC JET AIRPLANES AND  
SUBSONIC TRANSPORT CATEGORY LARGE AIRPLANES**

**Notice of Final Rulemaking  
(14 CFR Part 36)**

**OFFICE OF AVIATION POLICY AND PLANS,  
OPERATIONS REGULATORY ANALYSIS BRANCH, APO-310  
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## EXECUTIVE SUMMARY

This rulemaking will provide nearly uniform noise standards for subsonic transport category large airplanes and subsonic turbopowered airplanes certificated in the United States and in the Joint Aviation Authority (JAA) countries. The amendments will more closely harmonize the flight test conditions, procedures and reporting requirements mandated by the provisions of subparts A and B, and Appendices A and B of part 36 with the corresponding provisions of the Joint Aviation Regulations (JAR) 36.

The rule will make five substantive changes to the existing provisions of Subparts A, B, and C of part 36. It replaces existing Appendices A and B with a new Appendix A, modifies existing Appendix C and changes its designation to Appendix B, Appendix C will be reserved, and minor editorial changes will be made to Appendices G and H.

The FAA concludes that the final rule is cost beneficial. Costs for this rule will be \$314,100 (\$231,000 discounted) over a 10 year period; these costs include one-time costs to the FAA of \$17,400 (\$15,200 discounted). The rule provides the aviation industry with \$11.43 million (\$8.02 million, discounted) in cost savings over 10 years.

The rule will not have a significant impact on a substantial number of small entities. Adoption of the rule is a positive step toward removing impediments to international trade. The rule does not contain a federal intergovernmental or

private sector mandate that exceeds \$100 million in any year, therefore, the requirements of the Unfunded Mandates Reform Act of 1995 do not apply.

## I. INTRODUCTION

This regulatory evaluation examines the economic impact of a final rule amending 14 CFR part 36 that significantly harmonizes the U.S. noise certification regulations with the European Joint Aviation Requirements (JARs) for subsonic jet airplanes and subsonic transport category large airplanes. The changes will provide nearly uniform noise certification standards for airplanes certificated in the United States and in the European Joint Aviation Authorities countries.<sup>1</sup> The harmonization of the noise certification standards simplify airworthiness approvals for import and export purposes. The rule will make five substantive changes to the existing provisions of Subparts A, B, and C of part 36. It will replace existing Appendices A and B with a new Appendix A, modify existing Appendix C and change its designation to Appendix B, and Appendix C will be reserved and minor editorial changes will be made to Appendices G and H.

In addition to the benefit-cost analysis, this regulatory evaluation contains a regulatory flexibility determination, which analyzes the economic impact of the regulatory changes on small entities, as required by the Regulatory Flexibility Act of 1980, as amended. This evaluation also contains an assessment of the effect of the regulatory changes on international trade, as required by the Trade Agreement Act of 1979. Finally, this document contains an Unfunded Mandate Assessment, as required by the Unfunded Mandates Reform Act of 1995.

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<sup>1</sup> The member states of the JAA are: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

## II. BACKGROUND

In June of 1990, the Federal Aviation Administration (FAA) and the Joint Aviation Authority (JAA) agreed to harmonize their regulations. On October 17, 1995, the Aviation Rulemaking Advisory Committee (ARAC)<sup>2</sup> established the Federal Aviation Regulations/Joint Aviation Regulations Harmonization Working Group for Subsonic Transport Category Large Airplanes and Subsonic Turbojet Powered Airplanes (60 FR 53824). The Working Group was tasked with reviewing and harmonizing the applicable provisions of Subparts A, B, and C, and Appendices A, B, and C of part 36 and the corresponding applicable provisions of the Joint Aviation Regulation (JAR) 36. Appendices A, B, and C of part 36 specify the aircraft noise measurement and evaluation procedures, and noise levels necessary to demonstrate compliance with certification requirements for subsonic turbojet airplanes and subsonic transport category large airplanes. The Working Group was also asked to review the applicable provisions of Annex 16 issued by the International Civil Aviation Organization (ICAO). The thrust of the Working Group's efforts was to harmonize the content of the existing regulations.

After an extensive review, the Working Group formulated recommendations for resolving the differences and forwarded them to the appropriate oversight body for

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<sup>2</sup> The FAA established the Aviation Rulemaking Advisory Committee (ARAC) (56 FR 2190 January 22, 1991; and 58 FR 9230, February 19, 1993) to provide industry input in the form of information, advice, and recommendations to be considered in the full range of FAA rulemaking activities.

consideration and disposition. Recommendations for amending part 36 were forwarded to the ARAC.

### **III. THE RULE**

#### **Overview**

Part 36 contains noise standards for various aircraft types and airworthiness certification requirements. For the purposes of part 36, noise is designated as the effective perceived noise level (EPNL) and is measured in units of effective perceived noise levels (EPNdB), commonly referred to as “decibels.” The rule makes five substantive changes to the existing provisions of Subparts A, B, and C of part 36. It replaces existing Appendices A and B with a new Appendix A, modifies existing Appendix C and changes its designation to Appendix B, reserves the designation Appendix C, and makes minor editorial changes to Appendices G and H. The changes can be grouped into three major categories: (1) substantive technical changes; (2) non-substantive technical and editorial revisions; and (3) redesignation of materials in existing Appendices A and B, and C into new Appendices A and B to more closely align part 36 and JAR 36 formatting.

The new Appendix A - Aircraft Noise Measurement and Evaluation, combines existing Appendix A - Aircraft Noise Measurement, and existing Appendix B - Aircraft Noise Evaluation, into a single appendix. Under the harmonization changes contained in Appendix A some sections of the existing Appendices A and

B are modified, replaced or deleted while other sections contain updated requirements for measurement and analysis systems. Several items are moved to a revised Advisory Circular (AC) 36-4C, which is being released concurrent with this final rule. The new Appendix A also contains a definitions section, makes technical changes in required measurements, adds new reporting items, and modifies correction procedures of test results.

The new Appendix B - Noise Levels for Transport Category and Jet Powered Airplanes Under Section 36.103, replaces existing Appendix C. The new Appendix B leaves some sections of the existing appendix unchanged, deletes others, harmonizes terminology to the international standard, changes test procedures for propeller-driven large aircraft, and clarifies and updates test requirements.

The final rule also removes several existing sections that should have been removed by previous amendments to part 36.

## **Section - by - Section Summary**

### **Section 36.1**

Section 36.1(d)(3) has been removed. This section should have been removed by Amendment 36-10 (43 FR 28406, June 29, 1978) which redesignated section 36.1(d)(3) as section 36.1(d)(1)(iii).

Section 36.1(f) and its subparagraphs are revised to incorporate changes in terminology, i.e., from “takeoff” to “flyover” and “sideline” to “lateral”, and “turbojet” to “jet” and the changes to part 36 appendix and section designations that result from this final rule..

### Section 36.2

Section 36.2 will be retained and revised instead of being removed as proposed in the NPRM. Section 36.2, currently requires that a noise certification applicant show compliance to the part 36 amendment that is in effect on the date of certification. This requirement was included in part 36 before the FAA had the authority to prevent the issuance of a type certificate for an aircraft for which available and reasonable noise reduction design practices had not been incorporated. The FAA subsequently received this authority under the Noise Control Act of 1972; and therefore concluded the retroactive requirements contained in section 36.2 were no longer necessary. However, based on comments filed by the Aerospace Industries Association, the FAA has revised section 36.2 so that a part 36 certification amendment is the amendment in effect on the date of application for the type certificate, amended type certificate, or supplemental type certificate. This change harmonizes the applicability provisions of part 36 with what the FAA understands to be the intent of those contained in section 1.7 of ICAO annex 16, Chapter 1.

### Section 36.6

Five specifications are being added to section 36.6. These specifications are referred to under amended section A36.3, which updates requirements for measurement and analysis systems to address the latest standards and equipment technology. Updated addresses for the International Electrotechnical Commission, American National Standards Institute, and FAA Regional Headquarters are also included in amended section 36.6.

### Section 36.7

Section 36.7 is revised to incorporate changes in terminology, i.e., from “takeoff” to “flyover”, “sideline” to “lateral”, and “turbojet” to “jet”. Section 36.7 is also revised to reflect the changes to part 36 appendix and section designations that result from this final rule.

### Section 36.101 and 36.103

Sections 36.101, Noise measurement, and 36.103, Noise evaluation are replaced with a new section 36.101, Noise measurement and evaluation. The new section 36.101 reflects the consolidation of the contents of the current Appendix A and Appendix B into the new Appendix A. This change more closely aligns part 36 and JAR 36 formats without any substantive change. Similarly, the FAA redesignates section 36.201 as section 36.103

## Subpart C

The designation for subpart C is reserved<sup>3</sup>

## Section 36.301

Section 36.301 is revised by replacing the reference to “Appendix C” with a reference to “Appendix B”.

## Section 36.1581

Section 36.1581 is revised to incorporate changes in terminology, i.e., from “takeoff” to “flyover”, “sideline” to “lateral”, and “turbojet” to “jet”. Section 36.1581 is also revised to reflect the appendix designation changes.

Appendix C is reserved.<sup>4</sup> Appendix A replaces existing Appendix A and Appendix B. Appendix B replaces existing Appendix C.

Section A36.1 provides an introduction and overview of the Appendix.

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<sup>3</sup> Subpart C would be reserved for editorial purposes only.

<sup>4</sup> Appendix C would be reserved for editorial purposes only.

Section A36.2 contains the noise certification test and measurements conditions. It describes the terrain where the test should be conducted and the necessary atmospheric conditions. Most of this section is derived from existing sections A36.1, A36.5 and A36.9. The weather conditions under which the tests must be conducted are modified to allow a lower test day temperature limit. Changes have also been made to the relative humidity, and layering depth measurement parameters and the required weather recording time period.

Section A36.3 updates the requirements for the measurement of aircraft noise on the ground. It amends and revises the current section A36.3. All the components of the sound pressure level measuring system and their specifications and use are defined, including a sound calibrator, windscreen, microphone system, signal recording and conditioning devices, and one-third octave band analysis system. Reference ambient weather conditions including air temperature, static air pressure, and relative humidity were added for specifying the performance of a measurement system.

Section A36.4 will require that three basic physical properties of sound pressure (level, frequency distribution, and time variation) be measured in units of EPNdB to evaluate the subjective effects of airplane noise on human beings. This section includes the calculations necessary to make these determinations and also includes a minor technical change in the calculations of perceived noise levels (PNL) by requiring the use of a more precise formula. As a result of this change, the term  $10/\log 2$  is included in the equation used to calculate PNL instead of the rounded

off term (33.22). This change furthers the standardization between part 36 and JAR 36.

Section A36.5 outlines the test data reporting requirements. These reporting requirements include recording data on the test site, noise measuring equipment used, atmospheric conditions, airplane type and engine performance, and reference correction conditions. Section A36.5 will also require the reporting of several additional test items to the FAA. Information, if applicable, on the airplane's center of gravity, airbrake, auxiliary power unit operation, pneumatic engine bleeds, and engine power at takeoff will be required to be reported since these configuration items could affect the airplane's noise signature. Engine performance parameters specifically related to large propeller driven airplanes also must be reported.

Section A36.6 incorporates ICAO Annex 16 symbols and units into the existing nomenclature but does not result in any substantive technical change.

Section A36.7 prescribes the procedures for determining the atmospheric attenuation of sound. It replaces the use of the current tables and graphs used for this determination with formulas that are more accurate for calculating the weakening of the volume of sound over distance. The use of equations eliminates the minor differences that can arise from the use of tables and graphs.

Section A36.9 prescribes the appropriate adjustments to the test noise data when test conditions are not identical to reference conditions. It deletes a data correction procedure that is no longer relevant as well as several other provisions and makes several other revisions. Current sections A36.11(a) (1) and (2) are deleted because the original distinction between allowable and required positive and negative correction procedures of test results is no longer relevant. Existing section A36.1 (b) (3) is also deleted because it is obsolete. Other sections are moved to the new AC 36-4C.

Section B36.1 is a general statement that the noise level tests performed for transport category and jet powered airplanes must be in compliance with the standards prescribed in Appendix A or under approved equivalent procedures.

Section B36.3 prescribes reference noise measurement points for lateral full-power, flyover and approach measurements. It replaces current reference noise measurement terminology with international terms; “takeoff” is replaced by “flyover” and “sideline” is replaced by “lateral.” It includes a simplified test procedure for propeller-driven large airplanes. This procedure will eliminate the measurement difficulties currently encountered due to the directional nature of the noise from propeller-driven aircraft. Full power noise will be measured at a point (650 m) below the takeoff flight path rather than the current lateral measuring points which frequently result in significant differences in noise levels between the port and starboard sides of a propeller-driven airplane. This overflight measurement method will be an alternative to the current lateral method until

2002, when the overflight method will become mandatory. Text has been added to define and clarify reference points for noise measurements.

Section B36.4 addresses differences in location between the reference and test measurement points. The existing section A36.1(b)(7) alternate sideline noise measurement procedure is moved to AC 36-4C. A special requirement for propeller-driven aircraft to use symmetrically positioned microphones at each test measurement point has been added. This change will account for the asymmetric nature of propeller noise.

Section B36.5 makes minor changes in format and wording to existing section C36.5. It does not change existing noise measurement/analysis procedures or noise limits.

Section B36.6 retains the existing section C36.5(b) trade-off provision. Section B36.6 also includes minor wording changes to the text in existing section C36.5(b). Under the trade-off provision, the test noise levels may exceed the standards set for Stage 2, and 3 airplanes at one or two of the measurement points if the overages are not greater than 3 EPNdB in total, and if no one overage is greater than 2 EPNdB, and if the overages are completely offset by reductions at the other measurement point(s).

Section B36.7 addresses takeoff and approach-reference procedures and replaces existing sections C36.7 and C36.9. The changes include the use of average engine

performance to calculate takeoff thrust or power, and the use of full takeoff power for the lateral noise measurement for tests conducted after March 19, 2002.

Section B36.8 addresses takeoff and approach test procedures. It limits the magnitude of permitted corrections when adjusting for deviations between test weights and maximum certified weight by specifying a limitation on the EPNL adjustment. The EPNL adjustment will not be allowed to exceed 2 EPNdB for takeoffs and 1 EPNdB for approaches. It also clarifies and updates the test airspeed tolerance requirements.

References to Appendices A, B and C that are contained in Appendices G and H are amended to conform to the redesignations.

#### **IV COMMENTS**

Four parties provided comments in response to the NPRM. Only one party, the Aerospace Industries Association (AIA) made any comment on the costs associated with the proposal and the reference concerned only one of the five broad categories to which AIA addressed its comments. In the category entitled “FAA differences representing additional or dissimilar requirements” AIA lists twelve sections of the NPRM that “either are or can be easily be interpreted to be different than those in Annex 16”. AIA states that “These differences, if maintained, would also make it much more difficult and costly to applicants that might want reciprocal approvals by different certificating authorities”. The FAA reviewed the sections in question and in some cases was unable to determine the

specific concern that the commenter was raising. In eight of the sections, the FAA views the minor text differences as serving to clarify part 36 requirements without introducing any additional or dissimilar requirements relative to Annex 16. In the ninth section, the FAA concludes that, rather than adding a burden, the changed text clarifies that the specified windscreen testing need only be performed under certain conditions and does not view the section as an additional or dissimilar requirement for ICAO Annex 16. The FAA corrected an equation in the tenth section. The FAA has been unable to identify any costs associated with ten of the twelve sections in question and in view of the lack of any specific cost data submitted by the commenter the FAA concludes that there are no additional costs associated with these amendments. The comments on the two remaining sections in question are beyond the scope of this rulemaking. In one case, adoption of the ICAO provision would violate United States administrative procedures and in the second case, the FAA intends to work within the ICAO process to achieve future resolution of the difference.

## **V. ANALYSIS OF COSTS**

The FAA has analyzed the expected costs of this regulatory rule for a 10-year period, from 2002 through 2011. As required by the Office of Management and Budget (OMB), the present value of this cost stream was calculated using a discount factor of 7 percent. All costs in this analysis are expressed in 2000 dollars.

Many of the changes in the rule are either editorial or procedural in nature. These types of revisions do not add any new requirements or impose costs. For example, Section A36.1 gives an overview of the Appendix, and hence, does not have any costs. Some sections expand or clarify the intent of the rule through reorganization, updated terminology, or clarified procedures, none of which impose any new requirements or costs.

However, some of the changes to part 36 entail changes that will impose additional costs. The sections of the final rule that will impose costs fall into three categories: (1) software costs, (2) additional or new measuring provisions, and (3) additional reporting requirements.

#### **V.A. Software Costs**

Section A36.3.7.6 specifies that the instant in time at which a SLOW<sup>5</sup> time weighted sound pressure level is characterized should be 0.75 seconds earlier than the actual readout time. Implementation of this change will require modifying the computer software used by the applicant. The FAA must verify the software change. The estimated time required to make the software change is 40 hours for each applicant. The estimated time required by the FAA to verify correct

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<sup>5</sup> This is defined as “the exponential time averaging process of the data signal.” A sound level meter will typically have two options for time-averaging a signal-namely, “FAST” and “SLOW” meter responses. These govern the rate of fluctuation of the meter’s ‘needle’ when the sound signal is rapidly varying. The averaging time associated with the “slow” response option is greater than that for “fast” response. The “fast” response is extremely difficult to read on a meter when the sound is varying.

implementation of the change is 20 hours. Based on internal data, the FAA estimates that 11 firms will incur this one-time cost. This is significantly less than the number of firms estimated in the NPRM. The NPRM erroneously included all original equipment and supplemental type certificate applicants as being required to make this software change when in fact only 11 firms currently have approved software and two firms are pending approval. Two of the current firms had previously been validated to the new standard and thus will not incur additional costs. The estimated cost per applicant is \$3,560 (40 hours x \$89 per hour) or a total industry cost of \$39,160 (\$3,560 x 11 applicants). The verification cost to the FAA is estimated at \$17,380 (20 hours x \$79 per hour x 11 applicants). The FAA estimates that these software costs will be incurred in the first 3 years of the 10-year period; the present value cost to the industry and the FAA will be \$34,250 and \$15,250, respectively.

#### **V. B. Measurement Costs**

Section B36.4(b) will add a special requirement for propeller-driven airplanes that will require the placement of symmetrically positioned microphones at each and every test measurement point. However, most applicants already take advantage of FAA-approved equivalent test procedures that require only one set of symmetrical microphones for sideline noise measurements. These equivalent test procedures will be unaffected by this change and most applicants are expected to continue to use them. However, if more than a two-microphone array were used, the cost will be realized as part of the certification test performed under the

specifications of JAR 36 or ICAO Annex 16. Industry sources estimate that there are currently six firms engaged in the noise certification of large propeller-driven airplanes and that all but one are foreign manufacturers that already incur this cost if they are not using the approved equivalent procedure. The domestic firm is a large entity that probably also already incurs this cost under the JAR specifications if it does not use the approved equivalent procedures. Therefore, changing part 36 will not result in increased costs for known applicants.

However, an applicant choosing to use multiple pairs of microphones could incur additional costs ranging up to an estimated \$29,350 per test. These costs will involve an increase in the number of microphone systems, including cable, calibration, site surveys, and data recording, analysis and reporting. The FAA has calculated costs assuming two domestic large-propeller applicants will conduct 4 tests meeting this requirement over the next 10 years. The total cost is estimated to be \$117,400, or \$83,000 discounted.

### **V. C. Reporting Costs**

Section A36.5 - Reporting of Data to the FAA.

Section A36. 5.2.5 (c-f, h [2], j) adds new data elements to be reported to the FAA and also specifies that this data must be reported in the applicant's noise certification compliance report. The items added are: (1) the airplane's center of gravity; (2) airbrake positions; (3) whether auxiliary power units (APU), when

installed, are operating; (4) conditions of pneumatic engine bleeds; and (5) for propeller-driven airplanes, engine performance and propeller rotational speeds. All of these new reporting requirements are test airplane operating configuration items that could effect the airplane's noise signature and are already a part of the international standard. Since most applicants already address these requirements under JAR 36 or ICAO Annex 16, and since the data is already reported to the FAA in the applicant's noise certification compliance report on a voluntary basis, the only additional cost expected is the labor cost for documenting data not previously required. These costs are based on the number of additional items to be reported and on the assumption of a lower and upper range of required labor hour increases. A minimum of 5 hours at \$105 per hour and a maximum of 25 hours at an hourly labor rate of \$84 were assumed based on the size of the applicant and the degree of automation used. These costs are estimated to range from \$525 (5 hours x \$105 per hour) for a highly automated applicant to \$2,100 (25 hours x \$84 per hour) for a non-automated applicant per certification.

Based on FAA estimates, 14 noise certification projects involving flight tests are undertaken each year. Four of these projects are conducted among the 15 foreign firms that already comply with these new reporting requirements under JAR 36 or ICAO Annex 16 and thus will not incur additional reporting costs. Ten projects are conducted from among the 24 domestic firms engaged in flight testing and the FAA estimates that these firms will conduct 100 tests over the next 10 years. The FAA further estimates that some domestic firms will incur additional reporting costs of \$1,315 per test, based on the midpoint of the estimated additional labor

costs noted above  $((\$525+\$2,100)/2)$ . Domestic firms with a large international presence are estimated to conduct 40 of the 100 tests to be conducted over the next 10 years, based on the composition of the industry.<sup>6</sup> Since these larger firms already frequently comply with the existing international reporting standard, the FAA estimates that only 10 of the 40 tests to be conducted by these firms will incur the additional reporting costs of \$1,315 each, or a total of \$13,150. The FAA estimates that of the 60 tests to be conducted by smaller domestic firms 24 tests will incur the additional reporting costs of \$1,315 per test or a total of \$31,560 over the next 10 years. Thus, the additional labor costs for reporting the additional information will total approximately \$44,700 for these affected firms.

However, it is possible that some applicants might accrue additional costs. If an applicant is required to invest in new instrumentation or data recording equipment to comply with these requirements, the estimated total reporting costs could increase to between \$5,250 and \$10,500 per test. This is based on a range of estimates and scenarios involving purchasing and installing additional instrumentation, and labor for adding recording capability, data analysis, etc. For example, one possible scenario could entail the purchase and installation of instrumentation hardware at \$4,400 (\$2,620 for hardware and \$1,780 for labor [20 hours x \$89 per hour]), plus the labor cost for adding recording capability, and data recording and analysis at \$3,560 (40 hours x \$89 per hour) for a total of

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<sup>6</sup> This is a conservative estimate since many of the smaller firms were principally engaged in the certification of aircraft from Stage 2 to Stage 3. This line of business ceased in the year 2000 when the conversion of Stage 2 airplanes to Stage 3 was completed. It is assumed that these firms will continue to be engaged in the noise certification business.

\$7,960 of additional cost. The FAA estimates that three domestic firms, one large and two small, could incur this additional cost of \$7,960 for each test and that each of these firms will conduct 4 tests for a total of 12 tests over the next 10 years at a total cost of \$95,520. Thus, the total additional reporting costs to the industry will be \$140,200, or \$98,485 discounted, based on the minimal additional reporting costs of \$44,700 (\$13,150 for larger firms and \$31,550 for smaller firms) and \$95,520 (\$31,810 for a large firm and \$63,710 for smaller firms) incurred by the firms requiring additional instrumentation and data recording.

#### **V. D. Summary of Increased Costs**

The following table summarizes the estimated cost of changing the noise certification standards of part 36 and achieving greater harmonization with the JAA regulations.

Table 1: Total Cost of Final Changes to Part 36<sup>7</sup>

	<b>Total Cost</b>	<b>Present Value</b>
<b>Software Costs</b>		
Industry	\$39,160	\$34,250
FAA	\$17,380	\$15,200
<b>Total Software Costs</b>	<b>\$56,540</b>	<b>\$49,450</b>
Measurement Costs	\$117,400	\$ 83,000
Reporting Costs	\$140,200	\$ 98,500
<b>Grand Total Costs</b>	<b>\$314,140</b>	<b>\$230,950</b>
Total Industry Costs	\$296,760	\$215,750
Total FAA Costs	\$ 17,380	\$ 15,200

## VI. COST SAVINGS

Several of the amendments should result in cost savings to applicants, depending upon the current inventory of the applicant's test equipment and the particular weather circumstances of the flight test. However, given the uncertainty in the annual number and duration of flight tests, it is difficult to accurately quantify these savings. For example, Section A36.2.2.2 (b) will lower the minimum test temperature from 36 degrees Fahrenheit to 14 degrees Fahrenheit. This change is based on technical data from extensive noise testing experience. Under this change, testing will still be required to be conducted within the operational

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<sup>7</sup> Note that the software cost will be a one-time only expense and that the measurement cost will only be incurred by large propeller-driven applicants. Foreign applicants will not incur additional reporting costs and only a portion of the domestic firms will incur this cost.

temperature limits of the noise measuring equipment. One of the largest cost elements of the test certification process is the cost associated with airplane down time; by extending the temperature range, down time should be minimized. Down time occurs when the test aircraft, crew, equipment and technicians are ready to commence testing but testing is delayed or postponed because the weather conditions specified in Section A36.2 are not met. While airplane noise testing is not normally planned for cold weather, circumstances may dictate that the test be conducted under conditions which could take advantage of this new lower temperature. Under this circumstance, assuming various scenarios of daily temperature warming patterns that could result in reduced hours of airplane down time, an applicant might reduce the total on-site test time of a typical certification flight test conducted under these conditions by 10 to 15 percent.

As an example of the impact of permitting testing to be conducted at a lower temperature, assuming an on-site test time of 5 to 7 days to complete a typical certification flight test under these conditions, the applicant might reduce the total test time between half a day to one full day by testing during a time period when the lower temperature condition prevailed. Assuming a cost factor of \$157,240 to \$209,650 per day for larger planes and \$73,3800 to \$146,760 per day for smaller airplanes, cost reductions per test made possible by this change in minimum test temperatures could range between approximately \$78,600 and \$209,650 for larger airplanes and manufacturers and between \$36,700 and \$146,750 for smaller airplanes and manufacturers. The number of such tests conducted under cold

weather conditions might be, at most, one per applicant over a 10 year period. Some applicants might not encounter this situation during a 10 year period.

Based on the size of the firms conducting noise certifications, the FAA estimates that 25 larger applicants will each derive cost savings of \$144,100 per test and 14 smaller firms will save \$91,700 each per test, based on the mid-points of the estimated savings ranges. However, since it is possible that certain applicants may not encounter this situation in the 10-year period, the FAA has reduced the number of firms by three, one large and two small. Thus large firms will save \$3.46 million ( $\$144,100 \times 24$ ) and small firms \$1.1 million ( $\$91,700 \times 12$ ). The estimated industry cost savings over ten years totals \$4.56 million ( $\$3.46 + \$1.10$  million), or \$3.2 million discounted

Amended section B36.3 (a) includes a simplified test procedure that may be used in determining the sideline (lateral) noise level for propeller-driven large airplanes. This test procedure allows the full power noise measurement to be obtained at a point (650m) below the takeoff flight path and thus eliminates the problems associated with obtaining this measurement from the conventional sideline site. According to industry sources, 40 to 45 fly-bys per test will be eliminated, and between 2 and 8 microphone systems will be eliminated, depending on the size of the array used by the applicant. (Many applicants currently use a 2-microphone sideline array.) In addition to the savings resulting from the reduction in the number of fly-bys and the number of microphone systems, further cost savings will result from a reduction in site surveying and

field set-up expenses in addition to the analysis and reporting savings that result from fewer fly-bys. The total cost savings of these changes are estimated at \$200,000 to \$350,000 per test for manufacturers of propeller-driven large airplanes. These estimates are based on a range of potential scenarios involving combinations of the above elements (the number of fly-bys and the number of microphones used, flight test costs, etc.). As an example, based on a reduction of 42 fly-bys, the midpoint of the estimated range, and an example cost of \$6,290 per fly-by, cost savings of \$264,180 would be realized. In addition, assuming a reduction of 4 microphone systems, including surveying, setup, recording analysis and reporting at an assumed cost factor of \$7,340 per system, another \$29,360 (4 systems x \$7,340 per system) in savings will be realized, for a total savings of \$293,540 (\$264,180 plus \$29,360) per test under this example. The FAA estimates that no more than 10 tests will be conducted over the next 10 years and that the derived cost savings hypothetically will total \$2.94 million based on a per test savings of \$293,540 or \$2.06 million discounted.

Industry sources estimate that cost savings of \$26,200 to \$52,400 per year for those applicants with considerable certification activity will be realized by the harmonization of testing, data measurement and analysis, reporting and documentation and other noise certification efficiencies. Industry sources also claim that these cost savings will be achieved by a reduction in the confusion and the multiple interpretations that lead to delays, duplicate effort and costly negotiation caused by the existing dual certification standards. The FAA estimates that 10 firms engaged in noise certification activities, each employing

10,000 or more workers, will each achieve cost savings of \$39,310 (the midpoint of the estimated savings) or \$393,000 annually for the industry. The estimated industry cost savings over ten years totals \$3.93 million, or \$2.76 million discounted.

The following table summarizes the estimated cost savings of the final rulemaking.

Table 2: Total Cost Savings of Amendments to Part 36<sup>8</sup>

	B36.2.2.2	C36.3(a)	Efficiency	Total
	Savings	Savings	Savings	Savings
	\$4.56 million	\$2.93 million	\$3.93 million	\$11.4 million
	\$3.20 million	\$2.06 million	\$2.76 million	\$ 8.02 million

The FAA has not been able to quantify other potential savings that may be made possible by the greater efficiencies and flexibility resulting from the uniformity that the final rule provides.

## VII. SUMMARY

When the new rule becomes effective, U.S. noise certification procedures will be nearly uniform with the JAA procedures. This harmonization between the test

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<sup>8</sup> Note that while the cost savings of B 36.2.2.2. will benefit all applicants, C36.3(a) cost savings will only be realized by large propeller-driven applicants and only the largest applicants will realize the general efficiency cost savings

conditions, procedures, and noise levels necessary to demonstrate compliance with certification requirements for subsonic jet airplanes and subsonic transport category large airplanes will result in significant cost savings without compromising the environmental benefits of the noise certification standards.

The final rule's estimated cost savings, over ten years, (attributable to specific changes to part 36) will be \$7.5 million, or \$5.26 million discounted. In addition, \$3.93 million, \$2.76 million discounted, could be derived from overall efficiencies attributable to the harmonization effort in achieving near uniformity of the FAA and JAA standards for total hypothetical saving of \$11.43 million, \$8.02 million discounted.

The final rule's costs consist of software costs of \$56,500, measurement costs of \$117,400 and reporting costs of \$140,200 for a total of \$314,100, or \$230,900 discounted.

## **VIII. FINAL REGULATORY FLEXIBILITY DETERMINATION**

The Regulatory Flexibility Act of 1980 (Act) establishes “ as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation.” To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions.

be incurred by 2 other small firms or \$31,840 each. Additional labor costs for new reporting requirements totaling \$31,560 over the 10 year period will be incurred by 6 small applicants at a cost to each of these smaller applicants over the 10 year period of \$5,260. Eight small noise certification firms will incur one-time software costs of \$3,560 each. Small firms that incur the software charge and also incur labor costs to report additional data will have an annualized cost of \$780. The FAA does not consider these costs to be significant. The highest potential annualized cost, \$6,700, will be borne by two firms that incur both the software and reporting costs (\$780) and also elect to use multiple microphones four times each to measure the noise of a large propeller-driven airplane (\$5,910). The FAA does not have information on the revenues of these two potential small entrants but based on information about two small current manufacturers revenue from the sale of one of their aircraft ranges from \$750,000 to \$2.7 million depending on the model. If a new entrant sells only a single aircraft each year, the cost of this rule will be less than one percent of the lowest price aircraft. Hence, the FAA has determined that the estimated compliance costs of this rule are minimal.

Therefore, the FAA has determined that this final rule will not have a significant economic impact on a substantial number of small entities. Accordingly, pursuant to the Regulatory Flexibility Act, 5 U.S.C. 605(b), the FAA certifies that this rule will not have a significant economic impact on a substantial number of small entities.

## **IX. INTERNATIONAL TRADE IMPACT ASSESSMENT**

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards.

In accordance with the above statute, the FAA has assessed the potential affect of this final rule and has determined that it will impose the same costs on domestic and international entities for comparable services and thus has a neutral trade impact.

## **X. UNFUNDED MANDATES**

The Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995 is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments.

Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in a \$100 million or more expenditure (adjusted annually for inflation)

in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a “significant regulatory action.”

This rule does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.