Federal Aviation Administration
Aviation Rulemaking Advisory Committee

General Aviation Certification and Operations Issue Area
JAR/FAR 23 Harmonization Working Group

Task 1 – Review JAR Issue No 4 and No 5

Task Assignment

Federal Aviation Administration

Aviation Rulemaking Advisory Committee; General Aviation and Business Airplane Subcommittee: JAR/FAR 23 Harmonization Working Group

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of establishment of JAR/FAR 23 Harmonization Working Group.

SUMMARY: Notice is given of the establishment of the JAR/FAR 23 Harmonization Working Group by the General Aviation and Business Airplane Subcommittee. This notice informs the public of the activities of the General Aviation and Business Airplane Subcommittee of the Aviation Rulemaking Advisory Committee.

FOR FURTHER INFORMATION CONTACT: Mr. William J. (Joe) Sullivan, Executive Director, General Aviation and Business Airplane Subcommittee, Aircraft Certification Service (AIR-3), 800 Independence Avenue, SW., Washington, DC 20591, telephone: (202) 267-9554; FAX: (202) 267-9562.

SUPPLEMENTARY INFORMATION: The Federal Aviation Administration (FAA) established an Aviation Rulemaking Advisory Committee (56 FR 2190, January 22, 1991) which held its first meeting on May 23, 1991 (56 FR 20492, May 3, 1991). The General Aviation and Business Airplane Subcommittee was established at that meeting to provide advice and recommendations to the Director, Aircraft Certification Service, FAA, regarding the airworthiness standards for standard and commuter category airplanes and engines in part 23 of the Federal Aviation Regulations, and parallel provisions of parts 91 and 135 of the Federal Aviation Regulations.

The FAA announced at the Joint Aviation Authorities (JAA)-Federal Aviation Administration (FAA) Harmonization Conference in Toronto, Ontario, Canada, (June 2-5, 1992) that it would consolidate within the Aviation Rulemaking Advisory Committee structure an ongoing objective to "harmonize" the Joint Aviation Requirements (JAR) and the Federal Aviation Regulations (FAR). Coincident with that announcement, the FAA assigned to the General Aviation and Business Airplane Subcommittee those rulemaking projects related to JAR/FAR 23 Harmonization which were then in the process of being coordinated between the JAA and the FAA. The Harmonization process included the intention to present the results of JAA/FAA coordination to the public in the form of a Notice of Proposed Rulemaking—an objective comparable to and compatible with that assigned to the Aviation Rulemaking Advisory Committee. The General Aviation and Business Airplane Subcommittee, consequently, established the JAR/FAR 23 Harmonization Working Group.

Specifically, the Working Group's tasks are the following: The JAR/FAR 23 Harmonization Working Group is charged with making recommendations to the General Aviation and Business Airplane Subcommittee concerning the FAA disposition of the following rulemaking subjects recently coordinated between the JAA and the FAA:

Task 1-Review JAR Issues: Review JAR 23 Issue No. 4 (which excludes commuter category airplanes) and No. 5 (which includes commuter category airplanes), and compare them with Amendment 23-42 to FAR 23, and the proposals in Notices 3 and 4 from the Part 23 Airworthiness Review. Identify technical differences between JAR 23 and FAR 23 which can be harmonized.

Task 2-Systems and Equipment: Based on the results of the Task 1 review, identify the changes to Subparts D and F of FAR 23 that are appropriate for harmonization, and those provisions that should not be harmonized, if any.

Task 3-Powerplant: Based on the results of the Task 1 review, identify the changes to Subpart E of FAR 23 that are appropriate for harmonization, and those provisions that should not be harmonized, if any.

Task 4-Flight Test: Based on the results of the Task 1 review, identify the changes to Subparts A, B and G of FAR 23 that are appropriate for harmonization, and those provisions that should not be harmonized, if any.

Task 5-Airframe: Based on the results of the Task 1 review, identify the changes to Subparts C and D of FAR 23 that are appropriate for harmonization, and those provisions that should not be harmonized, if any.

Reports

A. Recommend time line(s) for completion of each task, including rationale, for Subcommittee consideration at the meeting of the subcommittee held following publication of this notice.

B. Give a detailed presentation to the subcommittee of the results of Task 1 before proceeding with Tasks 2-5.

C. Give a detailed conceptual presentation on Tasks 2-5 to the Subcommittee before proceeding with the work stated under item D, below. Each presentation should identify what proposed amendments will be included in each notice, and whether any additional notices will be need to be drafted in addition to the four identified in item D, below. These reports may be combined or presented separately at the discretion of the working group chair.

D. Draft a separate Notice of Proposed Rulemaking for Tasks 2-5 proposing new or revised requirements, a supporting economic analysis, and other required analysis, with any other collateral documents (such as Advisory Circulars) the Working Group determines to be needed.

E. Give a status report on each task at each meeting of the Subcommittee.

The JAR/FAR 23 Harmonization Working Group will be comprised of experts from those organizations having an interest in the task assigned to it. A working group member need not necessarily be a representative of one of the organizations of the parent General Aviation and Business Airplane Subcommittee or of the full Aviation Rulemaking Advisory Committee. An individual who has expertise in the subject matter and wishes to become a member of the working group should *write* the person listed under the caption "FOR FURTHER INFORMATION CONTACT" expressing that desire, describing his or her interest in the task, and the expertise he or she would bring to the working group. The request will be reviewed with the subcommittee chair and working group leader, and the individual advised whether or not the request can be accommodated.

The Secretary of Transportation has determined that the information and use of the Aviation Rulemaking Advisory Committee and its subcommittees are necessary in the public interest in connection with the performance of duties imposed on the FAA by law. Meetings of the full committee and any subcommittees will be open to the public except as authorized by section 10(d) of the Federal Advisory Committee Act. Meetings of the JAR/FAR 23 Harmonization Working Group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on November 19, 1992.

William J. Sullivan,

Executive Director, General Aviation and Business Airplane Subcommittee, Aviation Rulemaking Advisory Committee.

[FR Doc. 92-28931 Filed 11-27-92; 8:45 am]

BILLING CODE 4910-13-M

Recommendation Letter

Mr. Anthony Broderick
Associate Administration for Regulation
and Certification-AVR-1
Federal Aviation Administration
800 Independence Ave.
Washington DC, 20591

208 Patterson St.
Falls Church, VA 22046

March 1, 1994

Dear Mr. Broderick:

The ARAC, General Aviation and Business Aircraft Issues Group met on February 8, 1994. It was the group recommendation that the enclosed Airframe, Flight, Powerplant and Systems JAR/FAR 23 Harmonization Draft Notices should be forwarded to FAA Washington for publication. Each notice has been reviewed and endorsed by FAA Kansas City and Washington Legal and is accompanied by an executive summary and economic analysis prepared by FAA.

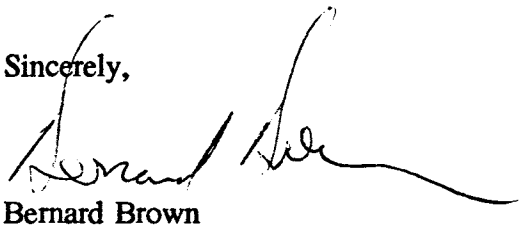
Also enclosed is a JAA letter to FAA dated January 20, 1994 to which is attached a table indicating the European study group disposition concerning text differences between JAR and FAR 23 following their review of notices 3 and 4 and the associated four draft harmonization notices. The FAA responses to the items listed which were endorsed by the issues group are also enclosed.

As you can see the JAR/FAR 23 and ARAC Working Groups with the support of the Kansas City Technical staff and the relevant FAA Staff in Washington have carried out an extremely thorough review over a considerable period of time. As you are undoubtedly aware prior to the formation of the four ARAC Working Groups, GAMA, AECMA, JAA, and the FAA had been working The JAR/FAR 23 Harmonization Program for approximately 2 years.

I believe all the people involved should be highly commended for a difficult and painstaking job very well done.

In view of the importance of the overall harmonization program every effort should be made to publish the NPRMS prior to the Annual JAA/FAA meeting in June.

Sincerely,



Bernard Brown
Asst. Chair, GABA Issues Group

cc John Colomy - FAA, Kansas City
Jim Dougherty - GAMA
Claude Schmitt - AECMA
Alain Leroy - JAA

Acknowledgement Letter

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

800 Independence. Ave., S.W.
Washington, D.C. 20591

MAR 2 8 1994

Mr. Bernard D. Brown
Assistant Chair, General Aviation and
Business Airplanes Issues
208 Patterson Street
Falls Church, VA 22046

Dear Mr. Brown:

Thank you for your March 1 letter forwarding the Aviation Rulemaking Advisory Committee (ARAC) recommendations to harmonize the Joint Aviation Requirements (JAR) and Federal Aviation Regulations (FAR) 23 airframe, flight, powerplant, and systems regulations.

The recommendations were submitted in a format suitable for processing and, therefore, will be presented to Federal Aviation Administration (FAA) management as quickly as possible. If management agrees with the recommendations, they will be published in the Federal Register as notices of proposed rulemaking.

I would like to thank the aviation community for its commitment to ARAC and its expenditure of resources to develop the recommendations. We in the FAA pledge to process them expeditiously as high-priority actions.

Again, let me thank the ARAC and, in particular, the JAR/FAR 23 Harmonization Working Group for its prompt action on the task that the FAA imposed.

Sincerely,

Anthony J. Broderick
Associate Administrator for
Regulation and Certification

Recommendation

[4910-13] [NOTICE MUST PRECEDE THE FLIGHT NOTICE (23.1323)]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 23 and 91

[Docket No. ; Notice No.]

RIN: 2120-

Airworthiness Standards; Systems and Equipment Proposals Based on European Joint Aviation Requirements Proposals

AGENCY: Federal Aviation Administration, DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes changes to the systems and equipment airworthiness standards for normal, utility, acrobatic, and commuter category airplanes. These proposals arise from the joint effort of the Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA) to harmonize the Federal Aviation Regulations (FAR) and the Joint Aviation Requirements (JAR) for airplanes that will be certificated in these categories. The proposed changes would provide nearly uniform systems and equipment airworthiness standards for airplanes certificated in the United States under 14 CFR part 23 (part 23) and in the JAA countries under Joint Aviation Requirements 23 (JAR 23), thereby simplifying airworthiness approval for import and export purposes.

DATES: Comments must be submitted on or before [Insert date 120 days after publication in the Federal Register].

ADDRESSES: Comments on this notice should be mailed in triplicate to: Federal Aviation Administration, Office of the Chief Counsel, Attention: Rules Docket (AGC-10), Docket No. , 800 Independence Avenue, SW., Washington, DC 20591. Comments delivered must be

marked Docket No. . Comments may be inspected in Room 915G weekdays between 8:30 a.m. and 5:00 p.m., except on Federal holidays.

In addition, the FAA is maintaining an information docket of comments in the Office of the Assistant Chief Counsel, ACE-7, Federal Aviation Administration, Central Region, 601 East 12th Street, Kansas City, Missouri 64106. Comments in the duplicate information docket may be inspected in the Office of the Assistant Chief Counsel weekdays, except Federal holidays, between the hours of 7:30 a.m. and 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: Earsa Tankesley, ACE-112, Small Airplane Directorate, Aircraft Certification Service, Federal Aviation Administration, 601 East 12th Street, Kansas City, Missouri 64106; telephone (816) 426-5688.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in the making of the proposed rule by submitting such written data, views, or arguments as they may desire. Comments relating to the environmental, energy, or economic impact that might result from adopting the proposals in this notice are also invited. Substantive comments should be accompanied by cost estimates. Comments should identify the regulatory docket or notice number and should be submitted in triplicate to the Rules Docket address specified above. All comments received on or before the specified closing date for comments will be considered by the Administrator

before taking action on this proposed rulemaking. The proposals contained in this notice may be changed in light of comments received. All comments received will be available, both before and after the closing date for comments, in the Rules Docket for examination by interested persons. A report summarizing each Federal Aviation Administration public contact concerned with the substance of this proposal will be filed in the docket. Commenters wishing the FAA to acknowledge receipt of their comments submitted in response to this notice must include a preaddressed, stamped postcard on which the following statement is made: "Comments to Docket No. ." The postcard will be date stamped and returned to the commenter.

Availability of NPRM

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Office of Public Affairs, Attention: Public Inquiry Center, APA-200, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267-3484. Communications must identify the notice number of this NPRM.

Persons interested in being placed on the mailing list for future NPRM's should request, from the above office, a copy of Advisory Circular No. 11-2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure.

Background

At the June 1990 meeting of the JAA Council (consisting of JAA members from European countries) and the FAA, the FAA Administrator

committed the FAA to support the harmonization of the FAR with the JAR being developed for use by the European authorities who are members of the JAA. In response to this commitment, the FAA Small Airplane Directorate established an FAA Harmonization Task Force to work with the JAR 23 Study Group to harmonize part 23 and the proposed JAR 23. The General Aviation Manufacturers Association (GAMA) also established a JAR 23/part 23 Committee to provide technical assistance in this effort.

Following a review of the first draft of proposed JAR 23, members of the FAA Harmonization Task Force and the GAMA Committee met in Brussels, Belgium for the October 1990 meeting of the JAR 23 Study Group. Representatives from the Association Europeenne des Constructeures de Material Aerospatial (AECMA), an organization of European airframe manufacturers, also attended. The main agenda item for this meeting was the establishment of procedures to accomplish harmonization of the airworthiness standards for normal, utility, and acrobatic category airplanes. The JAA had decided that its initial rulemaking effort should be limited to these three categories and that commuter category airworthiness standards should be addressed separately.

After that meeting, technical representatives from each of the four organizations (GAMA, AECMA, FAA and JAA) met to resolve differences between the proposed JAR and part 23. This portion of the harmonization effort involved a number of separate meetings of specialists in the flight, airframe, powerplant, and systems disciplines. These meetings showed that harmonization would require revisions to both part 23 and the proposed JAR 23.

Near the end of the effort to harmonize the normal, utility, and acrobatic category airplane airworthiness standards, the JAA requested and received recommendations from its member countries on proposed airworthiness standards for commuter category airplanes. The JAA and the FAA held specialist and study group meetings to discuss these recommendations, which resulted in proposals to revise portions of the part 23 commuter category airworthiness standards.

Unlike European rulemaking, where commuter category airworthiness standards are separate, for U.S. rulemaking, it is advantageous to adopt normal, utility, acrobatic, and commuter category airworthiness standards simultaneously, since commuter category airworthiness standards are already contained in part 23. Accordingly, this NPRM proposes to revise the systems and equipment airworthiness standards for all part 23 airplanes.

During the part 23 harmonization effort, the FAA established an Aviation Rulemaking Advisory Committee (ARAC) (56 FR 2190, January 22, 1991), which held its first meeting on May 23, 1991 (56 FR 20492, May 3, 1991). The General Aviation and Business Airplane (GABA) Subcommittee was established at that meeting to provide advice and recommendations to the Director, Aircraft Certification Service, FAA, regarding the airworthiness standards in part 23 as well as related provisions of parts 91 and 135 of the regulations.

The FAA announced, on June 2-5, 1992, at the JAA/FAA Harmonization Conference in Toronto, Ontario, Canada, that it would consolidate within the ARAC structure an ongoing objective to

"harmonize" the JAR and the FAR. Coinciding with that announcement, the FAA assigned the GABA Subcommittee those rulemaking projects related to JAR/part 23 harmonization that were in final coordination between the JAA and the FAA. The harmonization process included the intention to present the results of JAA/FAA coordination to the public as NPRM's. Subsequently, the GABA Subcommittee established the JAR 23 Study Group.

The JAR 23 Study Group made recommendations to the GABA Subcommittee concerning the FAA disposition of the rulemaking issues coordinated between the JAA and the FAA. The draft NPRMs previously prepared by the FAA harmonization team were made available to the harmonization working group to assist them in their effort.

The FAA received unsolicited comments from the JAA dated January 20, 1994, concerning issues that were left unresolved with the JAR 23 Study Group. The JAR/FAR 23 Harmonization Working Group did not address some of the unresolved issues because the JAA had not yet reached positions on those issues. Unresolved issues will be dealt with at future FAR/JAR Harmonization meetings. With respect to other issues unresolved by the JAR 23 Study Group, the JAR/FAR 23 Harmonization Working Group recommendations did not reflect harmonization, but reflected the technical discussion of the merits of each issue that had been thoroughly debated at the JAR/FAR 23 Harmonization meetings. (The Working Group Chairperson had been present at the Harmonization meetings.) The JAA comments have been placed in the docket for this proposal, and will be considered along with those received during the comment period.

Following completion of these harmonization efforts, the FAA determined that the proposed revisions to part 23 were too numerous for a single NPRM. The FAA decided to simplify the issues by issuing four NPRM's. These NPRM's address the airworthiness standards in the specific areas of systems and equipment, powerplant, flight, and airframe. These NPRM's propose changes in all seven subparts of part 23. Since there is some overlap, interested persons are advised to review all four NPRM's to identify all proposed changes to a particular section.

A notice of the formation of the JAR 23 Harmonization Working Group was published on November 30, 1992 (57 FR 56626). The group held its first meeting on February 2, 1993. These efforts resulted in the proposals for systems and equipment airworthiness standards contained in this notice. The GABA Subcommittee agreed with these proposals.

In addition to the initiatives described above, the FAA developed several rulemaking documents based on the 1983 Small Airplane Airworthiness Review Program. A number of the changes proposed in this document relate directly to final rule changes which were an outgrowth of the 1983 review. Amendment 23-43 (58 FR 18958, April 9, 1993) and Amendment 23-45 (58 FR 42136, August 6, 1993) are referenced in this document where relevant to the changes being proposed.

Discussion of Proposals

Section 23.75 Landing.

This proposal would, without substantive change, relocate the requirements of § 23.75(e) to § 23.735(c), Brakes. This requirement states that the wheel brake pressures used during the landing distance determination may not exceed the pressure specified by the brake manufacturer. Since pilots cannot ensure that a limit on the brake pressure is not exceeded during the performance testing of the airplane, such as during the landing distance determination, the brake system must be designed to ensure that the manufacturer's specified brake pressures are not exceeded when the brakes are applied. Accordingly, this requirement is more appropriately relocated in the brake requirements of § 23.735.

Section 23.677 Trim systems.

Proposed revised § 23.677(a) would clarify the need to mark the lateral and directional trim indicators with the neutral trim position. Since trim indicators on most airplanes are currently marked with the neutral position of the trimming device, this proposal would standardize the cockpit markings for all airplanes.

Revised paragraph (a) would also add a requirement for the pitch trim indicator to be marked with the proper pitch trim range for the takeoff of the airplane. Some takeoff accidents, including some involving fatalities, have occurred because the pitch trim was not set to the proper range needed for the airplane takeoff. Because of this accident experience, most of the current airplane manufacturers mark the pitch trim indicator with the pitch trim range for takeoff. Therefore, the proposed marking requirement

would not have a significant impact on future airplane designs and would ensure that the markings needed for a safe takeoff are provided for the pilots' use.

Section 23.691 Artificial stall barrier system.

This proposed new section would provide standards for stall barrier systems if a stall barrier is necessary to show compliance with § 23.201(c).

The requirements of § 23.201(c) provide criteria for the in-flight demonstration of wings level stall. The requirements also specify the means of identifying when a stall has occurred. Amendment 23-45 (58 FR 42136, August 6, 1993) revised § 23.201(c) by adding the activation of an artificial stall barrier as an acceptable means of identifying when a stall has occurred.

As the technology of airplane designs improved and engines with increased power became available, airplanes were developed that did not meet the older wings level stall requirement of § 23.201. Consequently, these airplanes were equipped with an artificial stall barrier that moved the airplane elevator controls and caused a nose down pitching motion similar to the pitching motion of airplanes that meet the wings level stall requirement of § 23.201. The manufacturer selected the airspeed where this pitching motion occurred and flight testing established compliance with the other flight regulations at airspeeds above the speed selected for the push. These stall barrier systems are commonly called "stick pushers." Such systems have been accepted for compliance with § 23.201 under the equivalent safety provisions of § 21.21(b)(1), since they provide a pitch motion that is equivalent

to that experienced during stalls of airplanes that meet the stall requirements of § 23.201. Appropriate compliance with other applicable requirements of part 23 has been established by other design characteristics of the stall barrier system.

The provisions of the proposed new section are based on system design characteristics necessary to ensure the safe operation of previously approved stall barrier systems. The proposed section also requires such systems to include provisions to prevent unwanted activation of the stall barrier system. This is necessary to ensure that such systems do not cause downward pitching motions at higher airspeeds when such pitching could be unsafe.

The proposed sections would basically codify those provisions that have been found necessary for approving stick pusher systems under the equivalent safety requirements of § 21.21(b)(1). Therefore, in effect, no new requirements would be added by this proposed amendment.

The proposed new section would be applicable only to airplanes with flight characteristics that need an artificial stall barrier system to ensure safe operation of that airplane. Including provision for the installation of an optional stick pusher system would relieve the manufacturer of the financial burden that would be needed to redesign the airplane so that it would meet the wings level stall requirements.

Section 23.697 Wing flap controls.

Proposed new § 23.697(c) would provide safety standards for the wing flap control lever designs installed in airplanes that use wing flap settings other than fully retracted when showing compliance with § 23.145. This revision is needed to ensure that the flap settings, which establish the safe operation of the airplane, can be positively selected.

Section 23.701 Flap interconnection.

Section 23.701(a)(1) and (a)(2) would be revised to clarify the requirements for flap systems installed on part 23 airplanes. Following the revision of § 23.701, as adopted by amendment 23-42 (56 FR 353, January 3, 1991), the FAA discovered that the new requirements could be interpreted in a way that was not intended and that this interpretation could result in approval of airplanes with unsafe flight characteristics in the event of flap failure. To clarify the intent of the requirements, the FAA issued on March 14, 1991, a policy letter to all aircraft certification offices that provided guidance for the correct application of the requirements.

Since then, the FAA has reexamined the requirements and determined that § 23.701(a)(1) and (a)(2) need to be revised to ensure that a failure of the flap system would not create an asymmetric flap configuration that could result in an unsafe flight condition. Therefore, § 23.701(a)(1) and (a)(2) would be revised to clarify that one of the following would apply:

(1) The moveable flap surfaces must be synchronized by a mechanical interconnection or by an approved equivalent means, that is independent of the flap drive system.

(2) The wing flap system must be designed so that any failures of the flap system that would result in an unsafe flight characteristic of the airplane, such as flap asymmetry, is extremely improbable.

These revisions would ensure that a failure of the flap drive systems will not result in a flap asymmetry configuration.

Section 23.703 Takeoff warning system.

This proposed new section would require a takeoff warning system on some commuter category airplanes. The requirement would be applicable if the flight evaluation showed that an unsafe takeoff condition would result if lift devices or longitudinal trim devices are set to any position outside the approved takeoff range. If the evaluation shows that no unsafe condition would result at any setting of these devices, a takeoff warning system would not be required. For those airplanes on which a warning system must be installed, the proposal would provide requirements for the installation of the system.

Section 23.723 Shock absorption tests.

Paragraph (b) of this section would be revised by changing the word "reserved" in the phrase "reserved energy absorption capacity" to "reserve."

Section 23.729 Landing gear extension and retraction system.

This proposal would revise § 23.729(e) to clarify that a landing gear indicator is required for each gear. The last sentence of current § 23.729(e) would also be removed. This sentence, which states that the switches may be located where they are operated by the actual landing gear locking latch or device, is advisory material and should not be included in the requirements. If future guidance is needed to identify acceptable switch locations, Advisory Circular 23.701-1 will be revised to include that information.

This proposal would also add a new § 23.729(g) requiring that if the landing gear bay is used as the location for equipment other than landing gear, the equipment must be designed and installed to minimize damage. On larger airplanes, such as the commuter category, a primary cause of damage to such equipment would be tire burst. In addition, service history has shown that rocks, water, and slush enter the landing gear bay and cause damage. The equipment on any size airplane should be protected from damage by such external sources.

Section 23.735 Brakes.

Section 23.735(a) would be revised to state plainly that wheel brakes must be provided. As discussed in this preamble in § 23.75, a proposed new § 23.735(c) would contain the requirement being removed from § 23.75.

Proposed new § 23.735(e), applicable to commuter category airplanes, would require establishing the minimum rejected takeoff brake kinetic energy capacity rating of each main wheel brake assembly. Section 23.45 provides that the determination of the accelerate-stop distance for commuter category airplanes be made in accordance with the applicant's procedures for operation in service. The proposed requirement is needed to ensure that the brakes will perform safely under accelerate-stop conditions.

Section 23.745 Nose/Tail wheel steering.

Proposed new § 23.745 would provide requirements that apply if nose/tail-wheel steering is installed. Advanced airplane design technology, along with the need to safely control the airplane when it is being operated on increasingly congested airports, has resulted in several small airplanes being equipped with systems for ground steering only.

The proposed new section would not require the installation of a system for ground steering, but it would add requirements to define how such a system should function if one is installed. It would also require the steering system to be designed so that it will not interfere with any installed landing gear retraction and extension system.

Section 23.775 Windshields and windows.

Section 23.775(a) would be revised to state that internal glass panels of windshields and windows must be constructed of a nonsplintering material, such as nonsplintering glass. Currently § 23.775(a) requires nonsplintering safety glass only. A nonsplintering material must be used to protect pilots from injury. While nonsplintering glass is an acceptable standard, other nonsplintering materials would be allowed under the proposal.

Section 23.775(c) would be revised to clarify that it applies to pressurized airplanes if certification for operation up to and including 25,000 feet is requested. This would not be a substantive change. It has always applied to such airplanes but is not as directly stated in the current rule as it would be in the proposed rule. Current § 23.775(e), which is being redesignated as § 23.775(d) by this notice without change, provides requirements for airplanes that are certified for operations above 25,000 feet. This revision of paragraph (c) and redesignation of paragraph (e) will clarify the requirements that are applicable to airplanes approved for operations at different altitudes. Redesignated paragraph (e) is revised to remove the masculine gender by rephrasing "when he is seated" to read "when the pilot is seated."

Section 23.775(h), introductory text, and paragraph (h)(1) would be added to require windshield panes of commuter category airplanes that are directly in front of the pilots to withstand the impact of a two pound bird. This requirement is based on a Joint Aviation Authority recommendation to add windshield bird strike protection for commuter category airplanes. Following receipt of

the recommendations, the FAA obtained and reviewed the International Civil Aviation Organization (ICAO) data on bird strikes that occurred on airplanes of 19,000 pounds or less from 1981 through 1989. These data show that approximately 550 strikes occurred and that one out of seven strikes hit the windshield. The bird strike reports, which include information on the type of bird, the airplane altitude and/or airspeed, show the following:

1. More than one-half of the strikes (51.8 percent) occurred between the ground and 100 feet above the ground.

2. Another one-fourth of the strikes (26.7 percent) occurred between 101 and 1000 feet.

3. The airplane airspeed at the time of most of the strikes (85 percent) was 150 knots or less.

4. Where bird types were reported, 27.6 percent involved small birds and 58.6 involved medium size birds.

5. Incidents where the airplane was damaged showed that 16.9 percent resulted from small bird strikes and 64 percent resulted from strikes involving medium size birds.

Evaluation of these data indicate that most bird strikes occur at takeoff and landing altitudes and airspeeds, and that medium or small birds, many weighing two pounds or less, are most often struck. Although only a few fatalities and injuries have resulted from these reported bird strikes, the data indicates a high probability of bird strikes during landings and takeoffs and the potential hazards of such strikes.

This proposed new paragraph would require that the windshield panes directly in front of the pilots of commuter category

airplanes, and the supportive structure for these panes, must withstand the impact of a two-pound bird at an airplane's maximum approach flap speed.

Proposed § 23.775(h)(2) would require the panels of the windshield to be arranged so that, if one is damaged, other panels will remain that will provide visibility for continuous safe flight and landing of the airplane.

By requiring full protection against the strike of a two-pound bird at approach speeds, some protection will also be provided if the airplane strikes a larger bird or strikes a bird at a higher speed.

Section 23.783 Doors.

Current § 23.783(b) requires that passenger doors not be located with respect to any propeller disk so as to endanger persons using the door. Proposed paragraph (b) would add that passenger doors must not be located in relation to any other potential hazard that could endanger persons using the door. The propeller disk remains the prominent hazard but other items, such as hot deicer surfaces or sharp objects on the airplane structure, are also hazards.

Proposed new paragraph (f) would require lavatory doors, if installed, that would not trap occupants inside a closed and locked lavatory compartment.

Section 23.785 Seats, berths, litters, safety belts, and shoulder harnesses.

Seat requirements of part 23 would be clarified by moving the seat provisions in current § 23.1307(a), which require a seat or berth for each occupant, to the introductory text of § 23.785. The requirement of § 23.1413, for a metal to metal latching device for seat belts and shoulder harnesses would also be referenced in § 23.785(b). These proposed changes would combine related seat requirements in one section.

Section 23.787 Baggage and cargo compartments.

Section 23.787 would be revised by extending the present requirements for cargo compartments to baggage compartments. As proposed, future baggage compartments on all airplane categories would be required to: be placarded for their maximum weight capacity; have a means to prevent the baggage from shifting; and have a means to protect controls, wiring, lines, and equipment or accessories that are located in the compartment and whose damage or failure would affect safe operation of the airplane. These standards have been applicable to cargo compartment designs for some time and should be applied to baggage compartments since the same safety factors are involved. Because manufacturers recognize the need for these standards, many of these provisions have been included in the current design of baggage compartments and, therefore, the proposed requirements are not expected to create a significant burden. With this revision the commuter category requirements of § 23.787(g) would be redundant and that requirement is being removed.

Proposed revisions to this section would also move the substance of paragraphs (d) and (f) to a proposed new § 23.855, which will address cargo and baggage compartment fire protection.

Proposed new paragraph (c) of this section would require flight crew emergency exits on all cargo configured airplanes to meet the requirements of § 23.807. This requirement would provide increased assurance that flight crews of all cargo airplanes will have ready access to an emergency exit.

Section 23.791 Passenger information signs.

This proposed new section would require at least one illuminated sign notifying all passengers when seat belts should be fastened. This proposed requirement applies to airplanes where flightcrew members cannot observe occupant seats or where the flightcrew member compartment is separated from the passenger compartment. When illuminated, the signs must be legible to all persons seated in the passenger compartment. Each sign must be installed so that a flightcrew member can turn it on and off from his or her station.

Section 23.807 Emergency exits.

Proposed new § 23.807(a)(4) would provide the same protection from any propeller disk and other potential hazard for a person who uses emergency exits as that provided by proposed § 23.783(b) for a person who uses a passenger door. (See discussion for proposed § 23.783 in this notice.)

The proposed revision of § 23.807(b) would provide that the inside handles of emergency exits that open outward must be protected against inadvertent operation. Currently this protection

is required by applying the general safety provisions of this subchapter. The addition of the specific requirement in § 23.807(b) would clarify the need for this protection by providing a requirement that addresses outward opening emergency exits.

The proposed revision to § 23.807(b)(5) and new § 23.807(b)(6) would apply to acrobatic and utility category airplanes that are approved for maneuvers, such as spinning. The proposed rule would require that emergency exits for these category airplanes allow the occupants to abandon the airplane at certain speeds related to such maneuvers. These emergency exits need to function under different environmental conditions than the emergency exits on normal category airplanes. The revision of the text in paragraph (b)(5) would provide the same terminology that is used in added new paragraph (b)(6).

Section 23.841 Pressurized cabins.

The proposed revision to § 23.841(a) would extend the cabin pressure requirements of current paragraph (a), which now apply to airplanes certificated for operation above 31,000 feet, to airplanes certificated for over 25,000 feet. Current 14 CFR part 25; JAR 25; and proposed JAR 23 include the same requirement as this proposal. This proposed requirement is intended to protect the airplane occupants from harm if a malfunction occurs at altitudes where symptoms of hypoxia occur, usually above 25,000 feet. Due to the increasing use of turbine powered engines, more part 23 airplanes will be approved for operations above 25,000 feet, thus exposing an increasing number of occupants, who may have some breathing difficulties, to these altitudes. The occupants

should have the same protection provided by the airworthiness standards of part 25 and JAR 25.

Section 23.853 Passengers and crew compartment interiors.

This proposal would revise the section heading from "Compartment Interiors" to "Passenger and Crew Compartment Interiors" for consistency with the introductory text of the section and to clarify the content of the section.

Section 23.855 Cargo and baggage compartment fire protection.

This proposed new section would require the following:

Proposed paragraph (a) would require all sources of heat within each cargo and baggage compartment that are capable of igniting the compartment contents to be shielded and insulated to prevent such ignition.

Proposed paragraph (b) would require cargo and baggage compartments to be constructed of materials that meet the appropriate provisions of § 23.853(d)(3). Currently these requirements apply to commuter category airplanes and to the materials used in the compartments of these airplanes. The proposed new requirement would expand this applicability to the cargo and baggage compartments of all part 23 airplanes. In effect, the proposed new requirement would require materials that are self-extinguishing rather than flame resistant as currently required under § 23.787(d).

Proposed new paragraph (c) would add new fire protection requirements for cargo and baggage compartments for commuter category airplanes. The proposed rule would require one of the following alternatives: (1) Either the compartment must be

located where pilots seated at their duty station would easily discover the fire or the compartment must be equipped with a smoke or fire detector system to warn the pilot's station. The compartment must also provide access to the compartment with a fire extinguisher. (2) The compartment may be inaccessible, but must be equipped with a fire detector system that warns the pilot station, and the compartment must have ceiling and sidewall floor panels constructed of materials that have been subjected to and meet the vertical self-extinguishing tests of appendix F of this part. (3) The compartment must be constructed and sealed to contain any fire.

The proposed new section is necessary for several reasons. The proposals for additional requirements for commuter category airplane cargo and baggage compartments were developed after an examination of reported incidents of inflight fires and their causes. Although most of these incidents of inflight fires occurred on transport category airplanes, the reported sources of the fires showed that the fires originate from sources, such as matches in the pockets of clothing, that are as likely to be found on part 23 airplanes as on transport category airplanes. The same potential for inflight fires exists on commuter category airplanes and adequate protection should be provided.

The potential for inflight fires also showed a need to examine the flame resistant requirements of current § 23.787(d) and to consider requirements that would improve the fire protection on other categories of airplanes. As a part of this consideration, fire protection was discussed with certain airframe manufacturing

representatives. Information provided in these discussions showed that materials that meet self-extinguishing flame requirements are available at about the same cost as materials that meet flame resistant requirements. Based on a review of the fire incidents and the information on availability of improved materials, the proposal for § 23.855(b), which would replace current § 23.787(d), would require self-extinguishing materials to be used in the cargo and baggage compartments of all part 23 airplanes.

Section 23.867 Electrical bonding and protection against lightning and static electricity.

This proposed revision would change the heading that precedes the section from "Lightning Evaluation" to "Electrical Bonding and Lightning Protection." It would also revise the section heading from "Lightning protection of structures" to "Electrical bonding and protection against lightning and static electricity." The proposed revisions more accurately clarify the content of the section.

Section 23.1303 Flight and navigation instruments.

The lead in for § 23.1303(a) would be revised to clarify that the instruments required by this section are the minimum ones required. Also, § 23.1303(d) would add a requirement for those airplanes whose performance must be based on weight, altitude, and temperature to be equipped with a free air temperature indicator. A new sentence added to § 23.1303(e)(2) would state that nuisance overspeed warnings should not occur at lower speeds where pilots might ignore the warning. A new paragraph (f) would propose requirements for attitude instruments that include a means for

flightcrew members to adjust the reference symbol. Finally, it would add a new paragraph (g) to define certain specific instruments required for a commuter category airplane.

The proposal for § 23.1303(e)(2) was developed following a Joint Aviation Authority recommendation that the warning should not occur below the maximum operating limit speed (V_{MO}/M_{MO}). To determine the effect that this recommended V_{MO}/M_{MO} limit would have on the design of overspeed warning devices, the FAA contacted several equipment manufacturers. These manufacturers responded that it would be possible to establish a lower limit at V_{MO}/M_{MO}, but that the design changes needed to ensure that the warning occurred between the presently required upper limit and the recommended lower limit would be very expensive.

The FAA notes that no known safety problem justifies the cost of these design changes. However, the FAA is also aware that if warnings of any type occur when the pilots know that no particular problem exists, such warnings may become a nuisance. If warnings become a nuisance, a pilot may disregard a warning when the airplane is approaching a flight speed where an unsafe flight condition may occur. Regulatory action is therefore needed to ensure that the warning will occur within appropriate speed limits. Proposed § 23.1303(e)(2) would require manufacturers to establish a lower speed limit so that nuisance overspeed warnings will not occur. The manufacturer would be required to show that this limit is appropriate for the airplane design but would not be required to set this lower limit at one specific speed, such as V_{MO}/M_{MO}, which would be costly to achieve.

A new § 23.1303(f) is proposed because attitude instruments are available that provide a means accessible to the flightcrew members, for adjusting the reference symbol through ranges that could result in unsafe pitch angles in small airplanes. These instruments were developed for airplanes that use high pitch angles for approved climb or descent gradients. By permitting these airplanes to use instruments that can be adjusted for these higher pitch angles, pilots are able to maintain the design gradients using an instrument that provides a normal indication at that pitch.

If such attitude instruments are installed in small airplanes, pilots could adjust the reference symbol to ranges that could result in unsafe pitch angles. The recommendation showed that some instruments can be adjusted to result in pitch angles that are nearly the same as the pitch angle that many small airplanes achieve before stalling. To preclude potential cases of unwanted pitch adjustments of attitude instruments installed in small airplanes, § 23.1303(f) proposes to limit the adjustment range to that limit that is needed for parallax correction.

Proposed new § 23.1303(g) would identify specific instruments, and limits of those instruments, required for commuter category airplanes. When the JAA initiated their consideration of commuter category airplanes, one of the proposals they received recommended adding the instrument requirements of § 25.1303 to part 23 for commuter category airplanes. In considering this recommendation, a review of the requirements showed that many instruments required under § 25.1303 are presently required by the operating rules. In

addition, § 23.1583(h) requires a list of the equipment that must be installed for the kinds of operation for which the airplane is approved. Based on the review, it was determined that many of the requirements in § 25.1303 would be redundant, and the recommendation was not accepted.

In considering a portion of the recommendation to require a third attitude instrument, the FAA noted that § 91.531(a)(3) requires a commuter category airplane of ten or more passengers to be operated with a second-in-command and that § 23.1321 requires flight and navigation instruments for each required pilot. Accordingly, two attitude instruments are required for a ten passenger, IFR approved commuter category airplane. Service experience has shown that failures of an attitude instrument system can occur where there will be a time period in which the indicator appears to be working but is providing incorrect information. During such a failure of one instrument in an airplane equipped with only two instruments, the pilots may have difficulty determining which instrument to follow, and hazardous flight attitudes may result. A third attitude instrument would allow the crew to retain reliable attitude information at all times, and thus the proposed rule would require a third attitude instrument for commuter airplanes operated by two pilots.

Section 23.1307 Miscellaneous equipment.

This proposal would remove the requirement of § 23.1307(a) which is being added to § 23.785. The discussion of § 23.785 covers this change.

Also, the provisions of § 23.1307(b)(1), (b)(2), and (b)(3), are being removed from § 23.1307. These requirements have been previously added to §§ 23.1361, 23.1351, and 23.1357, respectively; therefore, they are redundant and may be removed. The designator for paragraph (c) has also been removed from the remaining text of this section.

Section 23.1309 Equipment, systems, and installations.

Proposed new § 23.1309(a)(4) would correct an inadvertent omission that occurred when the FAA issued amendment 23-41 (55 FR 43306, October 26, 1990). The omitted requirement was adopted by amendment 23-34 as a portion of § 23.1309(d) and read: "In addition, for commuter category airplanes, system and installations must be designed to safeguard against hazards to the airplane in the event of their malfunction or failure." (52 FR 1833, January 15, 1987.) To correct this oversight, and continue the single fault provision of this paragraph, § 23.1309(a)(4) is being proposed.

Section 23.1311 Electronic display instrument systems.

This proposal would revise § 23.1311 to remove redundant requirements and to clarify which secondary instruments are required and the visibility requirements for these instruments. When § 23.1311 was adopted by amendment 23-41 (55 FR 43306, October 26, 1990), several nonsubstantive changes were made to the proposals in Notice 89-6 (54 FR 9345, March 6, 1989) to remove the redundancy included in the notice. In the process certain provisions, such as the one that permitted the installation of mechanical secondary instruments, were inadvertently omitted from

the final rule. Since the final rule, discussions with airplane manufacturer representatives have shown that the requirements defining the instrument panel location where secondary instruments may be installed are also not clear. Accordingly, the FAA is proposing to revise this section to correct and clarify these portions.

Current § 23.1311(a), which requires electronic display indicator installations that are independent to each pilot station, would be deleted because it is redundant with § 23.1321(a). Section 23.1321(a) requires that each flight, navigation, and powerplant instrument for use by any required pilot shall be located so that any pilot seated at the controls can monitor the instruments with minimum head and eye movement. As stated in the preamble of Notice No. 89-6 (54 FR 9345, March 6, 1989) regarding the proposed revision to § 23.1321, "This revision also clarifies the rule relative to instrumentation that must be provided for each pilot required for type certification or by the applicable operating rules. If a pilot is required by any applicable requirement, then that pilot must be provided all instrumentation required for any operations for which the airplane is approved." Accordingly, the requirements of current § 23.1311(a) would be removed.

In place of current paragraph (a), proposed § 23.1311(a) would be a revision of current paragraph (c) that would clarify what instruments are required and the visibility of those instruments. Proposed new § 23.1311(a)(1) would require electronic display

instrument installations to meet the arrangement and visibility requirements of § 23.1321(a).

Proposed § 23.1311(a)(2), (3), and (4) would be redesignated with no changes from current § 23.1311(c)(1), (2), and (3).

Proposed § 23.1311(a)(5) would continue the requirement of § 23.1303(c) for a magnetic direction indicator and, in addition, would require either an independent secondary mechanical altimeter, airspeed indicator, and attitude indicator or individual electronic display indicators for the altimeter, airspeed, and attitude that are independent from the airplane's primary electrical power. These secondary instruments may be installed in panel positions other than the primary location as long as the selected location allows the pilot to properly monitor the instruments and control the airplane.

The substance of proposed (a)(5) is a combination and substantive change of the current § 23.1311(b), which states that certain electronic display indicators must be independent of the airplane's electrical power system, and current § 23.1311(c)(4) which requires independent secondary attitude and rate-of-turn instruments and specifies the location of those instruments. Proposed § 23.1311(a)(5) would delete the requirement for a rate-of-turn instrument (in current § 23.1311(c)(4)) and specify that the required secondary instruments are those that provide altitude, airspeed, magnetic direction, and attitude. The information that would be provided by a secondary rate-of-turn instrument would not appreciably add to the safe operations of the airplane if the pilot has the information provided by the secondary attitude instrument.

Current § 23.1311(b) requires that electronic display indicators required by § 23.1303(a), (b), and (c) be independent of the airplane's electrical power system. The original intent of the requirement for secondary instruments, as stated in Notice No. 89-6, was to require the installation of either mechanical instruments or independent electronic display indicators powered by a source independent of the airplane's electrical system. However, the current rule does not clearly state this and does not address the installation of mechanical instruments. Proposed § 23.1311(a)(5), would allow either secondary electronic display indicators or mechanical instruments to provide a crew with information essential for continued flight and landing in the event of failure in the airplane's electrical power system.

Current § 23.1311(c)(5) and (6) would be redesignated as § 23.1311(a)(6) and (7) without change.

Proposed new § 23.1311(b) and (c) would continue the requirements of current § 23.1311(d) and (e) without change.

Section 23.1321 Arrangement and visibility.

The proposed revision to § 23.1321(d) would remove the wording that limits the instrument location requirement to airplanes certificated for flight under instrument flight rules or airplanes weighing more than 6,000 pounds. Instruments are for the pilot and should be located near that pilot's vertical plane of vision without regard to what flight rules are approved for the airplane's operation or the maximum weight of the airplane.

Section 23.1323 Airspeed indicating system.

The proposed new § 23.1323(c) would add a requirement that each airspeed indicating system design and installation should provide positive drainage of moisture from the system. This proposal is consistent with the provisions required for a static system by § 23.1325(b).

If moisture enters, or accumulates in, an airspeed indicating system, that moisture could cause erroneous airspeed indications or the complete loss of airspeed information. The resulting loss of accurate airspeed information would be hazardous to the operation of the airplane; therefore, to assure the safety of the airplane, the FAA would need to apply the more general airworthiness requirements of §§ 23.1301 and 23.1309 to such a system and require provisions for drainage of moisture. Accordingly, this proposed revision of the airspeed indicating systems requirements only clarifies the criteria that must be applied to airspeed indicating systems.

Existing paragraph (c) would be redesignated as paragraph (e), and the words "in flight and" would be removed from the first sentence. This would remove the requirement for the airspeed indicating system to be calibrated in flight because the in-flight requirement is already provided in paragraph (b). The calibration requirements of proposed redesignated paragraph (e) apply only to the accelerate-takeoff ground run.

Proposed new § 23.1323(g) would provide that, on those commuter airplanes where duplicate airspeed indicators are

required, the airspeed pitot tubes must be located far enough apart so that both tubes will not be damaged by a single bird strike.

As identified in the background of this notice, the FAA will issue additional notices that will address proposed changes to the requirements for powerplant, flight, and airframe. Revisions to subpart G in the flight notice will propose placing all of the requirements for what must appear in the Airplane Flight Manual (AFM) in that subpart. With the proposals to revise the AFM requirements, the flight notice will also propose that § 23.1323(d), redesignated as (f) in this notice, be removed.

Section 23.1325 Static pressure system.

Current § 23.1325(b)(3) establishes certain static pressure system requirements for airplanes that encounter icy conditions. Current § 23.1325(g) exempts from the requirements of (b)(3) airplanes that are prohibited from flight in instrument meteorological conditions in accordance with § 23.1559(b). After the adoption of § 23.1325(g), it came to the FAA's attention that there are conditions other than instrument meteorological conditions where icing may be encountered and, therefore, that this paragraph should also exempt from the provisions of § 23.1325(b)(3) airplanes that are prohibited from flight in icing conditions. Accordingly, § 23.1325(g) would be revised to read, "For airplanes prohibited from flight in instrument meteorological or icing conditions."

As indicated in the background section of this notice, the FAA will issue additional notices that will address proposed changes to the requirements for powerplant, flight, and airframe. Revisions

to Subpart G in the flight notice will propose to place all of the requirements that specify what must appear in the AFM in that subpart. With the proposals to revise the AFM requirements, the flight notice will also propose that § 23.1325(f) be removed and the results of the altimeter system calibration would be required by § 23.1587.

Section 23.1326 Pitot heat indication system.

Proposed new § 23.1326 would require the installation of a pitot tube heat indicating system on those airplanes required to be equipped with a heated pitot tube. Heated pitot tubes ensure that moisture will not freeze in the tube and block or partially block the airspeed indicating system. Such blockage would result in the pilots receiving incorrect flight data with possibly disastrous results.

Due to advancements in technology, many part 23 airplane installations now utilize equipment whose data sources are critical to the accurate and dependable operation of that equipment. The heated pitot tube is one such data source. The pitot heat indicating system will advise the pilots of any inoperative heating element in the pitot tube and that subsequent inaccuracies may result.

Part 23 airplanes certificated for flight under instrument flight rules or for flight in icing conditions are required by current § 23.1323(e) to have a heated pitot system or an equivalent means of preventing an airspeed indicating system malfunction due to ice accumulation. This proposal would require such airplanes equipped with a heated pitot tube to be equipped with a pitot tube

heat indicating system. This requirement will provide greater assurance that the pilots will not be dangerously misled by faulty flight instrument indications caused by pitot tube icing.

When pitot tube heat indicating system requirements were added to part 25, the FAA noted the occurrence of at least one accident and several incidents in which an airspeed indicating error occurred that might have been avoided if a pitot tube heat indicating system had been installed. Part 23 airplanes operate at lower airspeeds and over shorter distances than do part 25 airplanes; therefore, their exposure to moisture and temperature conditions where icing may occur is higher than it is for transport category airplanes. Because of this environmental exposure, the potential for an inoperative heated pitot tube becoming a hazard to part 23 airplanes is greater.

This proposed requirement also responds to National Transportation Safety Board (NTSB) recommendation A-92-85, which recommends requiring a modification to certain part 23 airplanes to provide for a pitot heat operating light similar to the light required by § 25.1326 for transport category airplanes. NTSB issued the safety recommendation, among others, as a result of a special investigation and analysis of a series of fatal accidents that occurred from May 31, 1989, through March 17, 1991.

Section 23.1329 Automatic pilot system.

New § 23.1329(b), adopted by amendment 23-24 (58 FR 18958, April 9, 1993), does not state clearly that stick controlled airplanes must be equipped with the same autopilot quick release controls that are required for airplanes with control wheels. This

proposed revision of § 23.1329(b) would clarify that a quick release control must be installed on each control stick of an airplane that can be operated from either pilot seat.

Section 23.1337 Powerplant instruments installation.

This proposal would revise the heading of this section to reflect the powerplant instrument installation requirements that it contains. The difference between this section and § 23.1305 is clarified by this change.

Section 23.1337(b) would be revised by removing the wording that authorizes installation of only those fuel indicators marked in gallons and pounds. In countries that use the metric system, other acceptable units of measure for marking fuel indicators are used. This proposed revision would allow the use of any appropriate measurement unit.

Section 23.1337(b) would also be revised by adding the word "usable" to the first sentence of this section. This revision is consistent with the requirements of § 23.1337(b)(1), which requires the fuel quantity indicator to be calibrated to read "zero" when the fuel in the tank is equal to the unusable fuel determined under § 23.959.

Proposed new § 23.1337(b)(4) would require a "means to indicate" the amount of usable fuel in each tank when the airplane is on the ground. This requirement would ensure that a reliable means is provided for the pilot to determine before takeoff that the amount of fuel that is in the airplane is adequate for the intended flight. The ability to make this preflight determination will help reduce the number of accidents that have resulted from

fuel starvation. This proposal, which is patterned after § 23.1337(d) and (d)(1), would not require a separate fuel indicating system. The means to determine the amount of fuel while on the ground may be provided by a calibrated dipstick, separate markings on the inflight fuel indicator, or any other acceptable means selected by the manufacturer. Accordingly, this proposal would contribute to the safe operation of the airplane and would not appreciably add to the cost of the airplane design.

Section 23.1351 General.

The proposal would revise current § 23.1351 by removing portions of paragraphs (b)(2) and (b)(3) and by removing all of paragraph (b)(4). The removed requirements are applicable to alternators that depend upon the battery for initial excitation or for stabilization. This revision responds to a Joint Aviation Authority recommendation to remove the provisions that allow a battery failure to result in the loss of the alternator. Information in this recommendation showed that self-excited alternators are now available for installation on newly certificated airplanes. The FAA has verified that self-excited alternators are now available; therefore, there is no longer a need for the regulations to address alternators that depend upon a battery for initial excitation and stabilization.

Revised § 23.1351(c)(3) would require an automatic means for reverse current protection. Reverse current protection is accomplished by means that automatically detect changes in the current. The proposed revised wording would more accurately define

this function and the equipment that would accomplish the protection.

Finally, § 23.1351(f) would be revised by adding a requirement that would require the ground power receptacle to be located where its use will not result in a hazard to the airplane or to people on the ground using the receptacle.

Section 23.1353 Storage battery design and installation.

Proposed new § 23.1353(h) would require that, in the event of a complete loss of the primary electrical power generating system, airplane battery capacity must be sufficient to supply at least 30 minutes of electrical power to those loads essential to the continued safe flight and landing of the airplane.

This proposal is not limited to airplanes that are approved for any particular type of operation. Although the battery capacity needed for an airplane approved for day visual flight rules (VFR) operations would be much less than the capacity for an airplane approved for day/night instrument flight rules (IFR) operations, the same level of safety should be provided for all airplanes. While this proposal would add an additional requirement to part 23 for normal, utility, acrobatic, and commuter category airplanes, in practice this requirement to provide a battery capacity sufficient to supply at least 30 minutes of electrical power is not new to many airplane manufacturers. Certain other countries in which part 23 airplanes have been certificated have requirements for such a 30-minute battery capacity. Manufacturers' experience with these requirements has shown that the only design impact that results from complying with these requirements is the

need to install a battery with greater capacity than might otherwise be installed. Experience has also shown that a load shedding procedure may be necessary for certain airplanes. No other airplane design changes would be needed.

Despite the above referenced experience record, this requirement would be new to some manufacturers and they may have questions on how it would be applied. For that reason, this notice discusses compliance considerations that have emerged from experience based on substantively equivalent requirements.

This compliance experience has shown that the rating of the battery selected for the airplane should be sufficient to cover the loss of capacity that would occur with battery age and the reduced capacity that results from a realistic state of charge, which may be less than a full charge. Using a design battery capacity that is only 75 percent of the battery nameplate rating would be an acceptable way of accounting for these losses.

In addition to determining the battery rating that would be needed, the manufacturer would also need to determine the functions that would be necessary for 30 minutes of safe flight and the landing of the airplane. Again, experience has identified several functions. For a day VFR approved airplane, no functions may require battery power; however, it may be necessary to supply power for certain communication capacities or, if the airplane has electrically powered retractable landing gear, power may be required to lower the gear. Providing a secondary means for lowering the gear would be an acceptable alternative to providing electrical power or battery power for this function.

For other types of operating approvals, providing power for the following functions and equipment should be considered:

1. Any required flight and navigation instruments. Air driven instruments that would function over the required period can also be accepted for this function.

2. Cockpit and instrument lighting.

3. For IFR and icing approvals, power for the heated pitot tube.

4. For radio communication, usually one VHF communication system with power for three to five minutes of transmission would be acceptable.

5. Functions needed for safe night flight and night landing of the airplane.

6. Electronic engine ignition systems.

7. Any functions that cannot be readily shed following the loss of generator power.

8. Engine inlet heat or deicing protection required for normal operation of the airplane.

Although power for the listed functions may provide for the safe operation and landing of most airplanes, individual airplane designs may require the consideration of additional functions.

In applying these rules it may be assumed that airframe and engine icing protection equipment would not be operating at the time of the generator system failure. Power for icing protection would not be required if the icing protection equipment is not required for the normal operation of the airplane.

This proposal would require additional battery capacity and would not alter or supersede any other requirements in this part for separate or dedicated emergency power supplies. When requirements such as those in current § 23.1331(a) or in proposed § 23.1311(a)(5) are applicable to the airplane design, these power supplies are required to provide a needed level of safety for that function; therefore, that power source must be supplied.

Section 23.1359 Electrical system fire protection.

Proposed new § 23.1359 would require smoke and fire protection for electrical system installations. The provisions of § 23.1359(a) of this proposal state that electrical systems must meet the applicable requirements of §§ 23.863 and 23.1182.

Proposed § 23.1359(b) would require that the electrical systems components installed in designated fire zones and used during emergency procedures be fire resistant. This provision is needed to clarify the requirements for electrical system components that may be installed in the designated fire zones identified in § 23.1181.

Finally, § 23.1359(c) provides burn criteria for electrical wire and cables. A proposed revision to appendix F of part 23 that would add appropriate wire testing criteria is included in this notice.

This proposed burn criteria for wire is necessary because of the increased use of electrical systems in the design of part 23 airplanes and the resulting increase in the amount of electrical wire being installed. This increased use results in the need to ensure that wire insulating material does not become the source of

an in-flight fire and/or that it does not propagate a fire from another source. The electrical wire burn requirements in this proposal, along with the testing identified in revised appendix F, would ensure that installed electrical wire has insulating material that reduces the possibility of hazardous in-flight fires.

Section 23.1361 Master switch arrangement.

To harmonize with the JAR this proposal would revise § 23.1361(c) by making an editorial change to remove the last two words of the paragraph that read "in flight."

Section 23.1365 Electrical cables and equipment.

This proposal would revise § 23.1365(b) and would add three new paragraphs.

Section 23.1365(b) would be revised in relation to proposed new § 23.1359(c), which would require self-extinguishing insulated electrical wires and cables. Current § 23.1365(b) requires that cable and associated equipment that would overheat in the event of circuit overload or fault must be flame resistant and may not emit dangerous quantities of toxic fumes. The proposed revisions to § 23.1365(b) would remove electrical cables from the flame resistant requirement since the cables would be required to have self-extinguishing insulation under § 23.1359(c). The requirement for electrical cables and the associated equipment that would overheat to not emit dangerous quantities of toxic fumes has been retained.

The text of § 23.1365(b) that includes the words "at least flame resistant" would also be revised by removing the words "at least". The removed words implied that there were burn

requirements, other than the ones in this section, that must be met.

The three paragraphs that would be added by this proposal would require: (1) the identification of electrical cables, terminals, and connectors; (2) the protection of electrical cables from damage by external sources; and (3) installation criteria for cables that cannot be protected by a circuit protection device.

As identified in the discussion of proposed § 23.1359, there is an increasing use of electrical systems in part 23 airplanes. The resulting increase in the number of electrical wires used in part 23 airplanes makes proper installation difficult. The proposal for electrical cable identification would provide better assurance that the cables will be correctly installed initially and correctly reinstalled when airplane maintenance or modifications are accomplished. The other proposed new requirements would provide installation criteria that will ensure the protection of cables under circumstances that can be expected from the increased use of electrical systems.

Section 23.1383 Taxi and landing lights.

The landing light requirements of § 23.1383 would be revised by adding taxi lights to this section. When the landing light requirements were included in the normal, utility, acrobatic, and commuter category requirements, the same lights were used for both night landing and taxiing of the airplane. Due to availability of different types of lights, separate lights are now frequently installed for landing and for taxiing. Including the word "taxi"

in the heading would clarify that the requirements cover both kinds of lights.

Current § 23.1383(a), which requires the lights to be acceptable, would be deleted because it is unnecessary to state this. All lights that are found to meet the requirements of this section and other directly related airworthiness requirements are acceptable. The paragraphs would be redesignated accordingly.

Current § 23.1383(b)(3) requires that a landing light must be installed to provide enough light for a night landing. Proposed § 23.1383(c) would revise "night landing" to "night operation" since the requirements would also cover taxiing and parking. Proposed new paragraph (d) would require the lights to be installed so that they do not cause a fire hazard. This clarifies the need for such an evaluation.

Section 23.1401 Anticollision light system.

This proposal would revise § 23.1401 to require the installation of an anticollision light system on all part 23 airplanes. Current § 23.1401 requires an anticollision light system only if certification for night operations is requested. When the requirements for anticollision lights were first added to the Civil Air Regulations (CAR), part 3, in 1957, those requirements were needed to increase the conspicuity of the airplanes during night operations because of the increasing air traffic density and the newer airplanes' capability to attain higher speeds. At the time, the operating conditions did not show a need for such lights for daylight operations.

The number of airplanes that have been added to the fleet and the increasing speeds resulting from improved technology, especially the increasing use of turbine engines, now necessitates the conspicuity provided by anticollision lights for day operations as well. The FAA Accident and Incident data for the period 1984 through 1990 showed that 269 aircraft were involved in midair collisions in which 108 fatalities occurred. A review of this data shows that 234 of these aircraft were involved in accidents or incidents that occurred during VFR conditions and that 224 were involved during day operations. The other 10 were involved in operations at night or dusk. The reports on 35 aircraft did not identify the type of condition that existed.

Of the types of aircraft identified by the reports in this data, 60 were balloon, gliders, and other aircraft that were not certificated under part 23 and whose level of safety would not be changed by this proposal. When the data is revised by removing those reports, it shows that 209 small, part 23 airplanes operated under VFR conditions were involved in midair accidents or incidents and that at least 167 of these airplanes were being operated in day VFR conditions. Because the occupant capacity of all the aircraft in the data ranged from one to ten, it can be assumed that the fatality rate of .401 per aircraft (108 fatalities/269 aircraft) would be nearly the same for the 209 small airplanes as it was for the 269 aircraft. Based on this assumption, there would have been approximately 84 fatalities that occurred in the 209 small airplanes accidents and incidents.

The reports do not show if the airplanes involved were equipped with or were using anticollision lights. They do show that a need exists to reduce the number of accidents. Requiring the installation of anticollision lights on all newly certificated airplanes and, as proposed by revised § 91.209 in this notice, requiring operation of anticollision lights during day operations would increase the airplane's conspicuity and contribute to a reduction in the number of accidents. Even if such action is only 25 percent effective, a review of the 6-year service history indicates that approximately 21 fatalities could be avoided in a similar 6-year period. Many manufacturers have realized the additional safety that can be provided by the increased airplane conspicuity of using anticollision lights and have elected to install an anticollision light system on all of the airplanes they produce. Therefore, most airplanes are now being manufactured with an installed anticollision light system, and the FAA expects that this proposal would not result in an economic burden on the aviation community.

Section 23.1431 Electronic equipment.

This proposal would add three new paragraphs to § 23.1431. Proposed new paragraph (c) would require that airplanes required to be operated by more than one flightcrew member must be evaluated to determine if the flightcrew members can converse without difficulty when they are seated at their duty stations. Accident investigations have shown that, in some instances, conversation between the flightcrew members was severely hindered by the noise level in the cockpit and that the inability to communicate

contributed to the accident. If the required evaluation shows that the noise level does not impair conversation, no further action is required. However, if the evaluation shows that conversation will be difficult, an intercommunication system would be required.

Proposed new paragraph (d) would require that if installed communication equipment includes any means of switching from receive to transmit, the equipment must use "off-on" transmitter switching that will ensure that the transmitter is turned off when it is not being used. Transmitting equipment that remains in the transmit mode when not being used blocks the frequency being used and can create an unsafe condition by preventing other needed communication.

Proposed new paragraph (e) would require that if provisions for the use of communications headsets are provided, it must be demonstrated that flightcrew members can hear aural warnings when a headset is being used. Aural warnings are required to warn the pilot of a condition that necessitates the pilot taking action; therefore, it is necessary to ensure that such warnings would be effective even when headsets are being used.

During the development of the proposed new requirements in paragraphs (c) and (e), the FAA determined that compliance demonstrations should be conducted under actual cockpit noise conditions when the airplane is being operated. Accordingly, the first drafts of the proposed paragraphs included wording to the effect such as, "under adverse cockpit noise conditions expected during normal operation." The FAA, however, ultimately determined that such language could result in demonstrations conducted under

more severe noise conditions than needed. Therefore, all such wording has been deleted from these proposals. If the FAA determines in the future that noise conditions for demonstrations need to be specified, the FAA will define these conditions in advisory material.

Section 23.1435 Hydraulic systems.

Since the close of the comment period for the Small Airplane Airworthiness Review Program Notice No. 3 (55 FR 40598, October 3, 1990), now adopted by amendment 23-43 (58 FR 18958, April 9, 1993), the FAA has been involved in discussions of the installation of hydraulic accumulators that are permitted by § 23.1435(c). These discussions have shown that applicants are likely to find § 23.1435(c) difficult to understand because of the way it is worded. This notice would further revise § 23.1435(c) to clarify under what circumstances a hydraulic accumulator and reservoir may be installed on the engine side of any firewall.

Section 23.1447 Equipment standards for oxygen dispensing units.

Proposed new § 23.1447(a)(4) would require that if radio equipment is installed in an airplane, flightcrew oxygen dispensing units must be designed to allow the use of communication equipment when oxygen is being used. If radio equipment is installed, that equipment cannot perform its intended function if the flightcrew is not provided the proper means for its utilization under all operating conditions, including operations when oxygen is being used.

This proposal would not require all flightcrew oxygen dispensing units to be equipped with communication equipment.

Since an airplane may be operated in uncontrolled airspace, where two-way radio communication is not required and, at the same time, be at altitudes where oxygen is required for the flight crew members, some airplanes have a crew oxygen system but no radio equipment. It would be inappropriate to require the flightcrew dispensing units of those airplanes to be equipped with communication equipment.

The proposed revisions to § 23.1447(d) would require the flightcrew oxygen dispensing units to be automatically presented before the cabin pressure altitude exceeds 15,000 feet or be the quick-donning type if the airplane is certificated for operation above 25,000 feet. The requirement in paragraph (e) for the passenger dispensing units to be automatically presented if the airplane is approved for operation above 30,000 feet has not been revised. The revision to paragraph (d) would provide the flightcrew and the airplane passengers the same level of safety as provided by other airworthiness standards. This proposed revision is also consistent with the proposed revision of § 23.841 in this notice.

Section 23.1451 Fire protection for oxygen equipment.

This proposed new section would specify that fire protection is needed for oxygen equipment installations. Section 23.1451(a) and (b) would, respectively, prohibit the installation of oxygen equipment in designated fire zones and require that oxygen system components be protected from the heat from designated fire zones.

Proposed § 23.1451(c) would require oxygen equipment and lines to be separated from other equipment or to be protected in a manner

that would prevent escaping oxygen from striking grease, fluids, or vapors. The impingement of pure oxygen on certain materials will lower their combustion point to a value where ignition will occur in ambient conditions thereby creating a potential source for an airplane fire. In one instance, an airplane was destroyed by fire that resulted when escaping oxygen impinged on lubricating material during maintenance of the airplane. The proposed new section would ensure that oxygen systems are protected to prevent fire hazards that can result from escaping oxygen.

Section 23.1453 Protection of oxygen equipment from rupture.

This proposed new section would clarify the rupture protection needed for oxygen system installation. Rupture protection for oxygen systems is currently required by the application of the structures load requirements of part 23. The addition of § 23.1453(a) would clarify the application of these load requirements and would identify the need to consider maximum temperatures and pressures that may be present. Section 23.1453(b) would identify the protection to be provided for high pressure oxygen sources and the high pressure lines that connect such sources to the oxygen system shutoff valves.

Section 23.1461 Equipment containing high energy rotors.

This proposal would revise paragraph (a) of this section to clarify that the requirements apply to high energy rotors included in an auxiliary power unit (APU). Following the addition of this section to part 23, the FAA issued a policy message that showed § 23.1461 was adopted to cover equipment such as APU's and constant speed drives that may be installed on small airplanes. The

proposed revision of paragraph (a) will clarify the applicability of this section as identified in that policy material.

Appendix F.

This proposal would revise appendix F to provide the procedures needed to test electrical wire to ensure that the wire meets the burn requirements of § 23.1359. It would also add procedures for meeting the 45 degree and 60 degree angle burn test requirement proposed for §§ 23.855(c)(2) and 23.1359(c), respectively. Paragraph (b) would be revised to clarify the specimen configuration that must be used in the testing procedures that are proposed to be added by this notice.

Section 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.

Proposed new § 91.205(b)(11) would require that airplanes certificated under § 23.1401 of this notice be equipped with an anticollision light system for day VFR operations. Day VFR operations are discussed under § 23.1401 of this notice.

Section 91.209 Aircraft lights.

Proposed new § 91.209(b) would require that airplanes equipped with an anticollision light system be operated with the anticollision light system lighted during all types of operations, except when the pilot determines that, because of operating conditions, it would be in the interest of safety to turn the lights off.

Regulatory Evaluation, Regulatory Flexibility Determination, and Trade Impact Assessment

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these analyses, the FAA has determined that this rule: (1) would generate benefits that would justify its costs and is not a "significant regulatory action" as defined in the Executive Order; (2) is not "significant" as defined in DOT's Policies and Procedures; (3) would not have a significant impact on a substantial number of small entities; and (4) would not constitute a barrier to international trade. These analyses, available in the docket, are summarized below.

Regulatory Evaluation Summary

This section summarizes the costs and benefits of each provision of the proposed rule. Many of the provisions would impose either no cost or a negligible cost. Such provisions are typically administrative, editorial, clarifying, relieving, or conforming in nature. In addition, the FAA holds that certain provisions have a potential safety benefit that can be achieved with no incremental cost, due primarily to the fact that this rule

would apply to future certificated airplanes and retrofitting would not be required. All provisions of the proposed rule, including those with no or negligible costs, are summarized below. Only those provisions with non-negligible costs are further evaluated in the section that follows. The reader is directed to the full regulatory evaluation for additional information.

Section	INCREMENTAL COST	BENEFIT
Section 23.75 Landing.	None.	Administrative.
Section 23.677 Trim systems.	Negligible.	Safety.
Section 23.691 Artificial stall barrier system.	None.	Administrative.
Section 23.697 Wing flap controls.	$480 per certification and $100 per airplane for affected airplanes.	Nominal safety and relief.
Section 23.701 Flap interconnection.	None.	Clarification.
Section 23.703 Takeoff warning system.	$240 per certification for evaluation. Where necessary, $5,120 per certification, $1,000 per airplane and $100 per year.	Nominal safety and relief.
Section 23.723 Shock absorption tests.	None.	Editorial.
Section 23.729 Landing gear extension and retraction system.	¶ (e). None.	Clarification.

Section	INCREMENTAL COST	BENEFIT
	¶ (g). Negligible, general practice.	Minor; general practice.
Section 23.735 Brakes.	¶ (a). None.	Editorial clarification.
	¶ (c). None.	Administrative.
	¶ (e). $240 per certification.	Minor safety.
Section 23.745 Nose/Tail wheel steering.	None.	Minor. Avoids special conditions.
Section 23.775 Windshields and windows.	¶ (a). None.	Relieving.
	¶ (c). None.	Clarification.
	¶ (h). Up to $350,000 per certification.	Safety.
Section 23.783 Doors.	¶ (b). None.	Minor safety.
	¶ (f). $25 per airplane.	Safety.
Section 23.785 Seats, births, litters, safety belts and shoulder harnesses.	None.	Editorial organization.
Section 23.787 Baggage and cargo compartments.	¶ (a). $1 per airplane.	Minor safety.
	¶ (b). $60 per certification and up to $100 per airplane.	Safety.

Section	INCREMENTAL COST	BENEFIT
	¶ (c). None.	Clarification.
Section 23.791 Passenger information signs.	$60 per certification, up to $200 per airplane, and a negligible effect on operating costs.	Safety.
Section 23.807 Emergency exits.	¶ (a)(4). Expected negligible.	Minor safety.
	¶ (b) and (b)(5). None.	Clarification and editorial.
	¶ (b)(6). Where chosen, $10,000 per certification and $500 per airplane.	Safety.
Section 23.841 Pressurized cabins.	$1,000 per certification and $2,000 per airplane.	Safety.
Section 23.853 Passenger and crew compartment interiors.	None.	Editorial.
Section 23.855 Cargo and baggage compartment fire protection.	¶ (a). Less than $40 per airplane.	Minor safety.
	¶ (b). Less than $200 per airplane.	Safety.
	¶ (c). Potentially as high as $1,800 per certification, $4,550 per airplane, and $100 per year.	Safety.
Section 23.867 Electrical bonding and protection against lightning and static electricity.	None.	Editorial.

Section	INCREMENTAL COST	BENEFIT
Section 23.1303 Flight and navigation instruments.	Introduction. None.	Clarification.
	¶ (d). $500 per certification and $350 per airplane.	Safety.
	¶ (e)(2). None.	Minor safety.
	¶ (f). None.	Minor safety.
	¶ (g)(1). Up to $2,000 per airplane.	Safety.
	¶ (g)(2). None.	Minor safety.
	¶ (g)(3). Up to $3,600 per certification and $7,000 per airplane.	Safety.
Section 23.1307 Miscellaneous equipment.	None.	Editorial and conforming.
Section 23.1309 Equipment, systems, and installations.	None.	Minor safety.
Section 23.1311 Electronic display instrument systems.	None.	Clarifying, editorial, and relieving.
Section 23.1321 Arrangement and visibility.	None.	Minor safety.
Section 23.1323 Airspeed indicating system.	None.	Minor safety.
Section 23.1325 Static pressure system.	None.	Relieving.
Section 23.1326 Pitot heat indication system.	$2,800 per certification, $1,600 per airplane.	Safety.

Section	INCREMENTAL COST	BENEFIT
Section 23.1329 Automatic pilot system.	None.	Clarifying.
Section 23.1337 Powerplant instruments installation.	Heading and ¶(b). None.	Clarifying, relieving.
	¶ (b)(4). Negligible.	Safety.
Section 23.1351 General.	¶ (b). None.	Administrative.
	¶ (c)(3). None.	Clarifying.
	¶ (f). None.	Minor safety.
Section 23.1353 Storage battery design and installation.	Where necessary, up to $30 per five years capital, up to $10 per year operating, and $600 per certification.	Safety.
Section 23.1359 Electrical system fire protection.	¶ (a). None.	Clarifying emphasis.
	¶ (b). Negligible.	Clarifying.
	¶ (c). $240 per certification.	Safety.
Section 23.1361 Master switch arrangement.	None.	Editorial.
Section 23.1365 Electrical cables and equipment.	¶ (b). None.	Conforming editorial.
	¶ (d). $4,400 per certification and $100 per airplane.	Safety.
	¶ (e). None.	Minor safety.

Section	INCREMENTAL COST	BENEFIT
	¶ (f). Negligible.	Minor safety.
Section 23.1383 Taxi and landing lights.	None.	Editorial update.
Section 23.1401 Anticollision light system.	Where necessary, $2,400 per certification and $1,600 per airplane.	Safety.
Section 23.1431 Electronic equipment.	¶ (c). Where necessary, up to $1,200 per certification and $1,600 per airplane.	Safety.
	¶ (d). Negligible. Included above.	Minor safety.
	¶ (e). None or negligible.	Safety.
Section 23.1435 Hydraulic systems.	None.	Clarifying.
Section 23.1447 Equipment standards for oxygen dispensing units.	¶ (a)(4). Up to $2,000 per airplane.	Safety.
	¶'s (d) and (e). None.	Minor safety.
Section 23.1451 Fire protection for oxygen equipment.	None.	Safety.
Section 23.1453 Protection of oxygen equipment from rupture.	$960 per certification.	Safety.
Section 23.1461 Equipment containing high energy rotors.	None.	Clarifying.

Section	INCREMENTAL COST	BENEFIT
Appendix F to Part 23 -- Test Procedure.	None. Considered above.	Minor safety.
Section 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.	None.	Safety, considered above.
Section 91.209 Aircraft lights.	$25 per year per airplane.	Safety, considered above.

Evaluation of Provisions with Non-Negligible Projected Costs

This section describes and evaluates those provisions of the proposed rule that are expected to impose costs that are not negligible.

Section 23.697 Wing flap controls. Proposed new § 23.697(c) would provide safety standards for the wing flap control lever designs installed in airplanes that use wing flap settings other than fully retracted when showing compliance with § 23.145. The FAA estimates that an aerospace engineer could design the flap control lever to meet the proposed requirement in 8 hours at a burdened rate of $60 per hour, totalling $480 per certification. The control lever itself would impose an incremental cost, including installation, of approximately $100 per airplane.

The nominal benefits of this provision would derive from the increased safety afforded the pilot in positively selecting the

proper flap setting to maintain longitudinal control. In fact, if a flap position other than fully retracted were needed to maintain longitudinal control: (1) that position would be necessary to prevent an unsafe condition, (2) the airplane would not be certificated under that design, and (3) the airplane would have to be redesigned so that intermediate flap positions would not be needed for control. Proposed paragraph (c) would allow the identification of an intermediate flap position and the positive means of selecting that position. This alternative would rectify the unsafe condition without requiring the manufacturer to redesign the airplane.

Section 23.703 Takeoff warning system. This proposed new section would require a takeoff warning system on some commuter category airplanes. The requirement would be applicable if the flight evaluation shows that an unsafe takeoff condition would result if lift devices or longitudinal trim devices are set to any position outside the approved takeoff range. If the evaluation shows that no unsafe condition would result at any setting of these devices, a takeoff warning system would not be required. For those airplanes on which a warning system must be installed, the proposed rule would provide requirements for the installation of the system.

The FAA estimates that an evaluation to determine whether a takeoff warning system would be needed would cost $240 (4 hours of engineering at a burdened rate of $60 per hour). Where needed, the integration design of a warning system would cost $2,400 (40 hours at $60 per hour). In addition, an incremental 4 hours of flight testing at a cost of $2,720 ($500 per hour for two test pilots and

$180 per hour for fuel) would be needed to demonstrate the system's performance. The FAA estimates that the system, including acquisition, wiring, micro switches, and labor, would add approximately $1,000 to the cost of each airplane required to have one. Maintenance of such a system would cost approximately $100 per year. The FAA solicits comments from interested parties concerning the expected certifications that would require a takeoff warning system and the concomitant costs to acquire, install, and maintain them.

The nominal benefits of this proposal would derive from the increased safety provided by the takeoff warning system that would activate whenever lift or longitudinal trim devices are not set within their approved takeoff ranges. In fact, if an evaluation showed that positions of the lift or longitudinal trim devices could create an unsafe condition on takeoff, the manufacturer would be required, under existing regulations, to redesign the devices so that the unsafe positions could not be obtained. The proposed section would provide relief by allowing the applicant to install a warning system rather than redesigning the trim device(s).

Section 23.735 Brakes. Proposed new § 23.735(e), applicable to commuter category airplanes, would require establishing the minimum rejected takeoff brake kinetic energy capacity rating of each main wheel brake assembly. Section 23.45 provides that the determination of the accelerate-stop distance for commuter category airplanes be made in accordance with the applicant's procedures for operation in service. This proposed requirement is needed to

ensure that the brakes will perform safely under accelerate-stop conditions.

Under the proposed rule, manufacturers of commuter airplanes could determine the kinetic energy absorption requirements either through a conservative rational analysis of the sequence of events expected during a rejected takeoff or by using a formula presented in proposed new § 23.735(e)(2). It is projected that the necessary determination would cost $240 based on four hours of engineering at a burdened rate of $60 per hour. The potential benefits of the proposal would derive from the added safety that would be provided by establishing beforehand the minimum necessary kinetic energy capacity rating of each main wheel brake assembly under rejected-takeoff conditions.

Section 23.775 Windshields and windows. Introductory text and paragraph (h)(1) would be added to require that commuter category windshield panes that are directly in front of the pilots be able to withstand the impact of a two pound bird at maximum approach flap speed. By requiring full protection against the strike of a two-pound bird at approach speed, additional protection would also be provided if the airplane strikes a larger bird or strikes a bird at a higher speed.

Proposed § 23.775(h)(2) would further require the panels of the windshield to be so arranged that, if one is damaged, other panels would remain to provide visibility for continuous safe flight and landing.

The potential costs of proposed § 23.775(h) would vary depending on the circumstances of the affected manufacturer.

Industry sources estimate that the total nonrecurring cost per model would range from $250,000 to $350,000, consisting of: (1) up to $200,000 for a bird strike test article ("bird gun") if the manufacturer does not have one; and (2) up to $150,000 of time and materials costs for the actual testing.

A manufacturer that has a bird strike test article would not incur additional capital test costs. Most manufacturers would incur up to $150,000 in time and materials costs for the actual testing, but even these costs would be mitigated by the existing need of most manufacturers to perform such tests for export sales to JAA member countries.

Industry sources estimate that there would be no identifiable increment in design or tooling costs since the windshield would be an integral part of the initial design. Similarly, little or no recurring costs per airplane (incremental materials, installation, or weight) are projected since it is reasonable to assume that the pressure load, as compared to bird strike resistance, would be the controlling factor in the windshield design strength.

The benefit of the proposed rule is the incremental protection against bird strikes that would be afforded to commuter category airplanes. The FAA has reviewed International Civil Aviation Organization (ICAO) data on bird strikes that occurred on member-country airplanes of 19,000 pounds or less from 1981 through 1989. These data show that approximately 550 strikes occurred and that one out of seven strikes hit the windshield. The data show that:

1. Almost 52 percent of the strikes occurred at altitudes of less than 100 feet, and 26.7 percent occurred between 101 and 1000 feet.

2. Eighty-five percent of the strikes occurred at airspeeds of 150 knots or less.

3. Where bird types were reported, 27.6 percent of the strikes involved small birds and 58.6 involved medium size birds (2 pounds or less).

4. Incidents where the airplane was damaged showed that 16.9 percent resulted from small bird strikes and 64 percent resulted from medium size bird strikes.

These data show that most bird strikes occur at takeoff and landing altitudes and airspeeds, and that birds weighing two pounds or less are struck most often. The standards of the proposed provision are based on these statistics. Few fatalities and injuries resulted from the bird strikes reported in the ICAO data. Similarly, a review of NTSB accident records between 1982 and 1992 revealed no U.S. accidents resulting from bird strikes to the windshields of commuter category airplanes. As a result, the FAA is not able to illustrate the justification of this provision on the basis of historical accidents. Instead, the standards are being proposed based on the expert recommendations of the ARAC. It is also noted that this standard will be applied in JAA member countries and that U.S. manufacturers wishing to export to those countries would be required to meet the standard in any event.

Given that this provision cannot be quantitatively supported on the basis of past accidents alone, the FAA expressly requests

public input and comments on its expected costs and potential benefits.

Section 23.783 Doors. Proposed new paragraph (f) would require that the locks on lavatory doors, if installed, be designed so that they would not trap occupants. Lavatory door locks used in transport category airplanes (see § 25.783) meet the requirements of this proposed rule. The FAA estimates that the incremental cost of this provision would be no more than $25 per lock. The proposal would reduce the likelihood that occupants would be trapped in a locked lavatory, both in emergency and non-emergency situations.

Section 23.787 Baggage and cargo compartments. The proposed rule would extend to normal, utility, and acrobatic airplanes the existing commuter requirement to prevent baggage from hazardous shifting. The FAA estimates that an aerospace engineer would be required for 1 hour, at a burdened cost of $60 per hour, to analyze the subject loads that would need to be constrained. Tiedowns would cost approximately $50 per baggage compartment, or no more than $100 per airplane. These additional costs would apply only to normal, utility, or acrobatic airplanes since commuter category airplanes are already subject to the requirement under the existing rule.

The potential benefits of the proposed provision include the reduced likelihood: (1) that baggage compartments would be overloaded, (2) that stowed baggage would shift dangerously, and (3) that essential co-located equipment or wiring would be damaged.

Section 23.791 Passenger information signs. This proposed new section would require at least one illuminated sign notifying

all passengers when seat belts should be fastened. The requirement would apply only to airplanes where flightcrew members could not observe occupant seats or where the flightcrew compartment is separated from the passenger compartment. The signs would have to be legible to all seated passengers and be operable from a crewmember station.

The FAA estimates that an aerospace engineer could design the required sign(s) in 1 hour, at a burdened rate of $60 per hour. The sign would cost approximately $200 per airplane, including parts and installation costs. Maintenance costs for bulb replacement would be negligible. The weight penalty associated with the light system would also be minor (no more than 2 pounds).

The safety benefits of the proposed change would derive from the increased likelihood that passengers would know when their seat belts should be fastened.

Section 23.807 Emergency exits. Proposed new § 23.807(a)(4) would provide the same hazard protection for a person using an emergency exit as that provided by proposed § 23.783(b) for a person who uses a passenger door. Emergency exits could not be located with respect to a propeller disk or any other hazard in a manner that would endanger persons using that exit.

The FAA holds that no incremental cost would be incurred to meet the standards of the proposed provision for newly certificated airplanes. However, this notice specifically requests that interested parties submit comments on the potential costs and methods of compliance that manufacturers would choose to comply with this proposed requirement.

Proposed paragraph 23.807(b)(5) would editorially revise the current egress requirements for acrobatic airplanes. Section 23.807(b)(6) would establish similar egress standards for utility category airplanes that are certificated for spinning. Industry sources estimate that an aerobatic, quick-release door would cost an incremental $10,000 in engineering design per affected airplane model and an additional $500 per production airplane. Little or no additional weight is expected. These costs would only apply in cases where the manufacturer determines that the marketplace return of a combination type certificate would outweigh the additional costs of design and production.

Section 23.841 Pressurized cabins. The proposed revision to § 23.841(a) would extend the cabin pressure requirements of current paragraph (a), which now apply to airplanes certificated for operation above 31,000 feet, to airplanes certificated for operation above 25,000 feet. Current part 25, JAR 25, and proposed JAR 23 include the same requirement proposed here. This proposed requirement is intended to protect airplane occupants from harm if a malfunction occurs at altitudes where symptoms of hypoxia occur, usually above 25,000 feet.

For airplanes that will be certificated for maximum altitude operation between 25,000 feet and 31,000 feet, the proposal would necessitate two additional pressure altitude regulators and associated plumbing. Industry sources estimate that the proposed requirement would cost an incremental $1,000 in engineering design per affected airplane model and $2,000 per production airplane. Any additional weight would be negligible.

The benefits of the proposal would derive from the incremental protection against hypoxia afforded to occupants of airplanes certificated for maximum altitude between 25,000 and 31,000 feet. Due to the increasing use of turbine engines, more part 23 airplanes are likely to be approved for operation above 25,000 feet. In the absence of this proposed rule, an increasing number of occupants would be exposed to the potential for harm in the event of a failure or malfunction of the pressure system on these airplanes.

Section 23.855 Cargo and baggage compartment fire protection. Proposed paragraph (a) would require all sources of heat within each cargo and baggage compartment that are capable of igniting the compartment contents to be shielded and insulated to prevent such ignition. Existing § 23.787(f) requires that cargo compartment lamps be installed so as to prevent contact between the lamp bulb and cargo. The proposal would clarify and extend this provision to include all sources of heat for baggage as well as cargo compartments.

Lights and (rarely) heaters for pets are typically the only sources of heat located in a baggage or cargo compartment. A wire cage, costing no more than $20, around the heat source would meet these requirements. The FAA estimates that the total cost of compliance per airplane would be no more than $40 in those rare cases where such protection would not have been provided anyway. The benefit of the proposed provision is a reduction in the possibility of fire caused by the ignition of compartment contents by lights or heaters.

Proposed paragraph (b) would require cargo and baggage compartments to be constructed of materials that meet the appropriate provisions of § 23.853(d)(3). Currently these requirements apply to commuter category airplanes and to the materials used in the compartments of these airplanes. The proposed new requirement would expand this applicability to the cargo and baggage compartments of all part 23 airplanes. In effect, the proposed new requirement would require materials that are self-extinguishing rather than flame resistant as currently required under § 23.787(d).

Information provided by manufacturers shows that materials that meet self-extinguishing flame requirements are available at a slightly higher cost than materials that meet flame resistant requirements. The FAA conservatively estimates that the incremental costs of complying with proposed § 23.855(b) would be less than $200 per airplane. The safety benefits of this provision would be an increase in cargo and baggage compartment fire protection.

Proposed new paragraph (c) would add new fire protection requirements for cargo and baggage compartments for commuter category airplanes. The proposed rule would require one of the following three alternatives:

(1) The compartment must be located where pilots seated at their duty station would easily discover the fire or the compartment must be equipped with a smoke or fire detector system to warn the pilot's station. The compartment must also be accessible for fire extinguisher application.

(2) The compartment may be inaccessible, but must be equipped with a fire detector system that warns the pilot station, and the compartment must have ceiling and sidewall floor panels constructed of materials that have been subjected to and meet the vertical self-extinguishing tests of appendix F to part 23.

(3) The compartment must be constructed and sealed to contain any fire.

The FAA cannot predict the designs of cargo and baggage compartments for future airplanes. If manufacturers choose to use smoke detectors, however, no more than 2 smoke detectors would be required per airplane. An aerospace engineer could determine the most appropriate location and design the smoke detector system in approximately 30 hours at a burdened rate of $60 per hour, for a total cost of $1,800 per certification. Two detectors, including wiring and installation, are estimated to cost about $4,550. Maintenance costs for the smoke detectors would cost approximately $100 per year. Materials that would meet the vertical self-extinguishing tests of appendix F (see option 2 in the discussion above) would result in incremental costs of less than $200 per airplane.

The FAA estimates that it would cost $500 to construct a sealed compartment, or a total of $1,000 for 2 compartments, if the manufacturer chooses that method of complying with the proposed requirement (see option 3 in the discussion above).

Irrespective of the individual compliance method, the benefits of the proposed provision would come from the increased likelihood

that a cargo or baggage compartment fire would either be extinguished or contained.

Section 23.1303 Flight and navigation instruments. Revised § 23.1303(d) would add the requirement for a free air temperature indicator for those airplanes whose performance must be based on weight, altitude, and temperature. This requirement already applies to turbine powered airplanes. The proposal would extend the requirement to reciprocating engine powered airplanes of more than 6,000 pounds. Industry sources estimate that the proposed requirement would cost an incremental $500 in engineering design per affected airplane model and $350 per production airplane. Any additional weight would be negligible. The potential benefits of the proposal would accrue from the requirement that the information necessary to determine the performance envelope of the airplane be available to the pilot.

Proposed § 23.1303(g) would identify specific instruments, and limits of those instruments, required for commuter category airplanes. Proposed § 23.1303(g)(1) states that if airspeed limitations vary with altitude, the airspeed indicators must show the variation of the maximum operating limit speed (V_{MO}) with altitude. Industry sources indicate that an airspeed indicator with a V_{MO} "pointer" would cost $1,000 more than one without. Two airspeed indicators are required on commuter airplanes, therefore, the incremental cost of this requirement would be $2,000 per commuter category airplane produced. The potential safety benefit of the proposal would derive from the requirement that the

information necessary to determine the maximum operating limit speed be available at all altitudes.

Proposed § 23.1303(g)(3) would require (for commuter category IFR-approved airplanes with passenger seating configurations of 10 or more) a third, independent, attitude indicator (AI). Industry sources estimate that an aerospace engineer could design and document a third attitude instrument system in 100 hours at a burdened rate of $60 per hour, totalling $6,000 per certification. It is estimated that an AI would cost approximately $8,000, including a standby battery, and that the installation would cost $2,200 for 40 hours of a mechanic's time at a burdened rate of $55 per hour. However, proposed § 23.1311(a)(5), discussed below, would delete the requirement for a rate-of-turn indicator when an independent attitude indicator is installed. The costs associated with a rate-of-turn indicator include: 40 hours of design and documentation costs, $1,000 per indicator, and 40 hours of installation. Therefore, the <u>incremental</u> cost for an IFR-approved airplane with a passenger seating capacity of 10 or more would be $3,600 for 60 hours of engineering (100 hours for the AI, minus 40 hours for the rate-of-turn indicator); $7,000 for the instrument ($8,000 for the AI, minus $1,000 for the rate-of-turn indicator); and no additional cost for the installation (40 hours for the AI, minus 40 hours for the rate-of-turn indicator).

The potential safety benefits of a third, independent attitude indicator would derive from the reduced potential for erroneous attitude information. Currently, two attitude instruments are required for a ten passenger, IFR approved commuter category

airplane. Service experience has shown that a failure can occur whereby an attitude indicator can appear to be working when it is actually providing incorrect information. During such a failure, pilots may have difficulty determining which instrument to follow, and hazardous flight attitudes may result. A third attitude indicator would allow the crew to retain reliable attitude information even in cases where one instrument is not operating correctly.

Section 23.1326 Pitot heat indication system. Proposed new § 23.1326 would require the installation of a pitot tube heat indicating system on those airplanes required to be equipped with a heated pitot tube. Heated pitot tubes ensure that moisture will not freeze in the tube and block or partially block the airspeed system.

A pitot heat indicating system, including an in-line current sensor, panel light, and associated wiring, would cost approximately $500. According to industry sources, an aerospace engineer could design and document such a system in 20 hours at a burdened rate of $60 per hour, totalling $1,200. A mechanic could install the system in 20 hours at a burdened rate of $55 per hour, totalling $1,100. The estimated non-recurring cost per certification, therefore, would total $2,800 ($1,200 for design, $500 for the certification airplane's indicator, and $1,100 for installation of that indicator). The estimated cost per production airplane would be $1,600 ($500 for the system and $1,100 for installation).

The National Transportation Safety Board (NTSB) investigated a series of single model accidents that occurred between May 1989 and March 1991. During that period, five fatal accidents and a near fatal incident occurred in the United States. Two additional fatal accidents involving the same airplane model occurred in foreign countries. The NTSB's analysis indicated that four of the five U.S. accidents probably involved ice blockage of the pitot tubes because the pilots failed to activate pitot heat before flying into freezing instrument meteorological conditions. The Board recommended (A-92-86) that the FAA consider requiring a pitot heat operating light on small airplanes certificated to operate in icing conditions.

A pitot heat indicating system would advise the pilots of any inoperative heating element in the pitot tube and the subsequent inaccuracies that could result. The proposed provision would reduce the likelihood that pilots would rely on inaccurate airspeed information resulting from a blocked or partially blocked pitot tube.

Section 23.1353 Storage battery design and installation. Proposed new § 23.1353(h) would require that, in the event of a complete loss of the primary electrical power generating system, airplane battery capacity must be sufficient to supply at least 30 minutes of electrical power to those loads essential to the continued safe flight and landing of the airplane.

In some cases, manufacturers may need to install larger batteries with greater capacities to comply with the proposed requirements. The FAA estimates that the size and capacity of a

larger battery would add no more than a few pounds (incremental operating costs of less than $10 per year) and $20 to $30 of additional cost for the battery.

On some airplanes, a "load shedding" procedure, where the pilot would sequentially turn off certain equipment, could be required either in place of or in addition to a larger battery. The procedure would be provided in the pilot's operating handbook (POH). The FAA estimates that an aerospace engineer could establish a load shedding procedure in 10 hours at a burdened rate of $60 per hour, for a total cost of $600 per affected certification.

Irrespective of the method of compliance, the proposal would increase the likelihood that sufficient electrical power would be available to safely land the airplane in the event of an electrical generating system failure.

Section 23.1359 Electrical system fire protection. Proposed § 23.1359(c) would provide burn criteria for electrical wire and cables. A proposed revision to appendix F to part 23 would add appropriate wire testing criteria. Demonstrating and documenting that electrical wires and cables meet the requirements of this provision would take an aerospace engineer approximately 4 hours at a burdened rate of $60 per hour, for a total of $240 per certification. The requirement and testing criteria would increase the likelihood that necessary wires and cables would continue to function in the event of a fire.

Section 23.1365 Electrical cables and equipment. Proposed § 23.1365(d) would add a requirement for the identification of

electrical cables, terminals, and connectors. Different colored wires and/or tags could be used in conjunction with a wiring diagram to identify the cables, terminals, and connectors. The FAA estimates that a draftsman could design and document this identification system in 80 hours at a burdened rate of $55 per hour, a total of $4,400 per certification. Incremental installation costs would be approximately $100 per airplane.

The increasing use of electrical systems in part 23 airplanes has added to the difficulty of wiring installation. The proposed requirement for cable identification would increase the likelihood that cables would be correctly installed initially and would be correctly reinstalled as part of later maintenance or modification.

Section 23.1401 Anticollision light system. The proposal would revise § 23.1401 to require the installation of an anticollision light system on all part 23 airplanes. Current § 23.1401 requires an anticollision light system only if certification for night operations is requested. Many manufacturers currently install anticollision light systems on all airplanes they produce.

Industry sources estimate that an aerospace engineer could design and document an anticollision light system in 40 hours at a burdened rate of $60 per hour, for a total of $2,400 per affected certification. The system would cost $500 and would take a mechanic approximately 20 hours to install at a burdened rate of $55 per hour, a total of $1,600 per affected airplane ($500 + (20 hours x $55 per hour) = $1,600). The weight penalty would be negligible. Only those future models that would not otherwise have

anticollision light systems would actually incur incremental costs as a result of this provision.

The number of airplanes that have been added to the small airplane fleet and the increasing speeds resulting from improved technology, especially turbine engines, warrant the use of anticollision lights for day operations as well as night. The FAA Accident and Incident data for the period of 1984 through 1990 contain 269 reports of aircraft that were involved in midair collisions or incidents in which 108 fatalities occurred. When the data were filtered (to account for night operations, IFR conditions, and aircraft not affected by this proposal), the remaining 104 airplanes were involved in accidents or incidents that occurred in VFR conditions. The reports do not reveal whether the airplanes were using anticollision lights at the time of the accident.

The FAA holds that requiring the installation of anticollision lights on all newly certificated airplanes, and requiring their operation during day operations (as proposed by revised § 91.209 and discussed later in this evaluation), would reduce the number of daylight, midair accidents. Even if the proposed requirement were only 25 percent effective, the 6-year accident history indicates that approximately 21 fatalities could be avoided during a similar 6-year period.

Section 23.1431 Electronic equipment. This proposal would add three new paragraphs to § 23.1431. Proposed new paragraph (c) would require that airplanes required to be operated by more than one flightcrew member must be evaluated to determine if the

flightcrew members can converse without difficulty when they are seated at their duty stations. If the required evaluation shows that the noise level does not impair conversation, no further action would be required. If the evaluation shows that conversation would be difficult, however, an intercommunication system would be required.

The FAA estimates that an evaluation of cockpit noise could be conducted in conjunction with other certification testing, therefore, no incremental costs are associated with the evaluation. An aerospace engineer could design an intercom system in 20 hours at a burdened rate of $60 per hour, for a total of $1,200 per affected certification. The FAA estimates that the addition of an intercom system would cost approximately $500 per airplane. A mechanic could install the system in approximately 20 hours at a burdened rate or $55 per hour. The total incremental production cost for an affected airplane, therefore, would be $1,600 ($500 + (20 hours x $55 per hour)).

Proposed new paragraph (d) would require that if the communication equipment that is installed includes any means of switching from the receive mode to the transmit mode, the equipment must use "off-on" transmitter switching that turns the transmitter off when it is not being used. The cost of this feature is included in the $500 cost of the intercom, described above.

NTSB investigations of at least two commuter accidents determined that excessive cockpit noise levels probably adversely affected the ability of the flight crews to communicate (Bar Harbor Airlines, Flight 1808, August 25, 1985, 8 fatalities; and

Henson Airlines, Flight 1517, September 23, 1985, 14 fatalities.) As a result, the Board recommended (A-86-113) that the FAA require the installation and use of crew interphone systems in the cockpit of airplanes operating under part 135. The benefit of the proposed requirement would derive from the increased likelihood that flightcrew members would be able to converse without difficulty and that the safety hazard of miscommunication would be reduced.

Section 23.1447 Equipment standards for oxygen dispensing units. Proposed new § 23.1447(a)(4) would require that if radio equipment is installed in an airplane, flightcrew oxygen dispensing units must be designed to allow use of the communication equipment when oxygen is being used.

Industry sources estimate that an oxygen mask with an integral microphone costs $1,000 more than an oxygen mask without a microphone. The costs per affected airplane, therefore, would be $2,000 for two masks. The benefit of the proposed requirement is that it would allow flightcrew communication under all operating conditions, including operations when oxygen is required.

Section 23.1453 Protection of oxygen equipment from rupture. This proposed new section would clarify the rupture protection needed for oxygen system installation. Rupture protection for oxygen systems is currently required by the application of the structures load requirements of part 23. The addition of § 23.1453(a) would clarify the application of these load requirements and would identify the need to consider maximum temperatures and pressures that may be present. Section 23.1453(b) would identify the protection to be provided for high pressure

oxygen sources and the high pressure lines that connect these sources to the oxygen system shutoff valves.

Industry sources estimate that an aerospace engineer could analyze and document the loads on each element of the oxygen system in 16 hours at a burdened rate of $60 per hour, for a total cost of $960. The routing of oxygen pressure sources and lines to protect them from unsafe temperatures and crash landings would be part of an airplane's basic design and would not impose incremental costs.

Section 91.209 Aircraft lights. Proposed new § 91.209(b) would require airplanes equipped with an anticollision light system to operate those lights during all operations, including daytime VFR.

The incremental cost of this provision would be incurred for light bulb replacement. The FAA estimates that a light bulb for an anticollision light system costs approximately $50 and that this provision would necessitate an incremental bulb replacement every two years. Accordingly, the cost is projected to equal $25 per year, per affected operating airplane.

In summary, the FAA holds that the benefits of the proposed rule, though not directly quantifiable, would exceed the expected costs. Each of the provisions, as well as the entire proposal, would be cost beneficial.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed rule would

have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, establishes threshold cost values and small entity size standards for complying with RFA review requirements in FAA rulemaking actions. The proposed amendments would not have a significant economic impact on a substantial number of small entities.

Trade Impact Assessment

The proposed rule would not constitute a barrier to international trade, including the export of American goods and services to foreign countries and the import of foreign goods and services into the United States. Instead, the proposed systems airworthiness standards have been harmonized with those of foreign aviation authorities and would lessen the restraints on trade.

Federalism Implications

The regulations proposed herein would not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

The FAA proposes to revise the airworthiness standards to provide systems and equipment standards for normal, utility, acrobatic, and commuter category airplanes that are the same as the standards that will be proposed for the same category airplanes by the Joint Aviation Authorities in Europe. If adopted, the proposed revision would reduce the regulatory burden on the United States and European airframe manufacturers by relieving them of the need to show compliance with different standards each time they seek certification approval of an airplane in a different country.

For the reasons discussed in the preamble, and based on the findings in the Regulatory Evaluation, the FAA has determined that this proposed regulation is not significant under Executive Order 12866. In addition, the FAA certifies that this proposal, if adopted, will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. This proposal is not considered significant under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). An initial regulatory evaluation of the proposal has been placed in the docket. A copy may be obtained by contacting the person identified under "FOR FURTHER INFORMATION CONTACT."

List of Subjects

14 CFR Part 23

Aircraft, Aviation safety, Signs and symbols.

14 CFR Part 91

Agriculture, Aircraft, Airmen, Airports, Air traffic control, Aviation safety, Canada, Cuba, Freight, Mexico, Noise control, Political candidates, Reporting and recordkeeping requirements, Safety, Smoking.

THE PROPOSED AMENDMENT

In consideration of the foregoing, the Federal Aviation Administration proposes to amend parts 23 and 91 of the Federal Aviation Regulations (14 CFR part 23 and 91) as follows:

PART 23--AIRWORTHINESS STANDARDS: NORMAL, UTILITY, ACROBATIC, AND COMMUTER CATEGORY AIRPLANES.

1. The authority citation for part 23 continues to read as follows:

Authority: 49 U.S.C. app. 1344, 1354(a), 1355, 1421, 1423, 1425, 1428, 1429, 1430; 49 U.S.C. 106(g).

§ 23.75 [Amended]

2. Section 23.75 is amended by removing the text of paragraph (e) and reserving that paragraph for future use.

3. Section 23.677 is amended by revising paragraph (a) to read as follows:

§ 23.677 Trim systems.

(a) Proper precautions must be taken to prevent inadvertent, improper, or abrupt trim tab operation. There must be means near the trim control to indicate to the pilot the direction of trim

control movement relative to airplane motion. In addition, there must be means to indicate to the pilot the position of the trim device with respect to both the range of adjustment and, in the case of lateral and directional trim, the neutral position. This means must be visible to the pilot and must be located and designed to prevent confusion. The pitch trim indicator must be clearly marked with a position or range within which it has been demonstrated that take-off is safe for all center of gravity positions and each flap position approved for takeoff.

* * * * *

4. A new § 23.691 is added to read as follows:

§ 23.691 Artificial stall barrier system.

If the function of an artificial stall barrier, for example, stick pusher, is necessary to show compliance with § 23.201(c), the system must comply with the following:

(a) With the system adjusted for operation, the plus and minus airspeeds at which downward pitching control will be provided must be established.

(b) Considering the plus and minus airspeed tolerances established by paragraph (a) of this section, an airspeed must be selected for the activation of the downward pitching control that provides a safe margin above any airspeed at which any unsatisfactory stall characteristics occur.

(c) In addition to the stall warning required by § 23.207, a warning that is clearly distinguishable to the pilot under all expected flight conditions without requiring the pilot's attention,

must be provided for faults that would prevent the system from providing the required pitching motion.

(d) Each system must be designed so that the artificial stall barrier can be quickly and positively disengaged by the pilots to prevent unwanted downward pitching of the airplane by a quick release (emergency) control that meets the requirements of § 23.1329(b).

(e) A preflight check of the complete system must be established and the procedure for this check made available in the Airplane Flight Manual (AFM). Preflight checks that are critical to the safety of the airplane must be included in the limitations section of the AFM.

(f) For those airplanes whose design includes an autopilot system:

(1) A quick release (emergency) control installed in accordance with § 23.1329(b) may be used to meet the requirements of paragraph (d) of this section, and

(2) The pitch servo for that system may be used to provide the stall downward pitching motion.

(g) In showing compliance with § 23.1309, the system must be evaluated to determine the effect that any announced or unannounced failure may have on the continued safe flight and landing of the airplane or the ability of the crew to cope with any adverse conditions that may result from such failures. This evaluation must consider the hazards that would result from the airplane's flight characteristics if the system was not provided, and the hazard that may result from unwanted downward pitching motion,

which could result from failures at airspeeds above the selected stall speed.

5. Section 23.697 is amended by adding a new paragraph (c) to read as follows:

§ 23.697 Wing flap controls.

* * * * *

(c) If compliance with § 23.145(b)(3) necessitates wing flap retraction to positions that are not fully retracted, the wing flap control lever settings corresponding to those positions must be positively located such that a definite change of direction of movement of the lever is necessary to select settings beyond those settings.

6. Section 23.701 is amended by revising paragraphs (a)(1) and (a)(2) to read as follows:

§ 23.701 Flap interconnection.

(a) * * *

(1) Be synchronized by a mechanical interconnection between the moveable flap surfaces that is independent of the flap drive system; or by an approved equivalent means; or

(2) Be designed so that the occurrence of any failure of the flap system that would result in an unsafe flight characteristic of the airplane is extremely improbable; or

* * * * *

7. A new § 23.703 is added to read as follows:

§ 23.703 Takeoff warning system.

For commuter category airplanes, unless it can be shown that a lift or longitudinal trim device which affects the takeoff performance of the aircraft would not give an unsafe takeoff configuration when selected out of an approved takeoff position, a takeoff warning system must be installed and meet the following requirements:

(a) The system must provide to the pilots an aural warning that is automatically activated during the initial portion of the takeoff roll if the airplane is in a configuration that would not allow a safe takeoff. The warning must continue until--

(1) The configuration is changed to allow safe takeoff, or

(2) Action is taken by the pilot to abandon the takeoff roll.

(b) The means used to activate the system must function properly for all authorized takeoff power settings and procedures and throughout the ranges of takeoff weights, altitudes and temperatures for which certification is requested.

§ 23.723 [Amended]

8. Section 23.723(b) is amended by changing the word "reserved" to "reserve".

9. Section 23.729 is amended by revising paragraph (e) and by adding a new paragraph (g) to read as follows:

§ 23.729 Landing gear extension and retraction system.

* * * * *

(e) Position indicator. If a retractable landing gear is used, there must be a landing gear position indicator (as well as necessary switches to actuate the indicator) or other means to inform the pilot that each gear is secured in the extended (or retracted) position. If switches are used, they must be located and coupled to the landing gear mechanical system in a manner that prevents an erroneous indication of either "down and locked" if each gear is not in the fully extended position, or of "up and locked" if each landing gear is not in the fully retracted position.

* * * * *

(g) Equipment located in the landing gear bay. If the landing gear bay is used as the location for equipment other than the landing gear, that equipment must be designed and installed to minimize damage.

10. Section 23.735 is amended by redesignating paragraph (c) as paragraph (d), by revising the introductory text of paragraph (a), and by adding new paragraphs (c) and (e) to read as follows:

§ 23.735 Brakes.

(a) Brakes must be provided. The landing brake kinetic energy capacity rating of each main wheel brake assembly must not be less than the kinetic energy absorption requirements determined under either of the following methods:

* * * * *

(c) During the landing distance determination required by § 23.75, the pressure on the wheel braking system must not exceed the pressure specified by the brake manufacturer.

* * * * *

(e) In addition, for commuter category airplanes, the rejected takeoff brake kinetic energy capacity rating of each main wheel brake assembly must not be less than the kinetic energy absorption requirements determined under either of the following methods--

(1) The brake kinetic energy absorption requirements must be based on a conservative rational analysis of the sequence of events expected during a rejected takeoff at the design takeoff weight.

(2) Instead of a rational analysis, the kinetic energy absorption requirements for each main wheel brake assembly may be derived from the following formula--

$KE = 0.0443\ WV^2/N$

where,

KE = Kinetic energy per wheel (ft.-lbs.);

W = Design takeoff weight (lbs.);

V = Ground speed associated with the maximum value of V_1 selected in accordance with § 23.51(c)(1);

N = Number of main wheels with brakes.

11. A new § 23.745 is added to read as follows:

§ 23.745 Nose/Tail wheel steering.

(a) If nose/tail wheel steering is installed, it must be demonstrated that its use does not require exceptional pilot skill

during takeoff and landing, in crosswinds and in the event of an engine failure; or its use must be limited to low speed maneuvering.

(b) Movement of the pilot's steering control must not interfere with the retraction or extension of the landing gear.

12. Section 23.775 is amended by revising paragraphs (a) and (c), by designating paragraph (d) as (e) and paragraph (e) as (d), and by adding a new paragraph (h) to read as follows:

§ 23.775 Windshields and windows.

(a) The internal panels of windshields and windows must be constructed of a nonsplintering material, such as nonsplintering safety glass.

* * * * *

(c) On pressurized airplanes, if certification for operation up to and including 25,000 feet is requested, an enclosure canopy including a representative part of the installation must be subjected to special tests to account for the combined effects of continuous and cyclic pressurization loadings and flight loads, or compliance with the fail-safe requirements of paragraph (d) of this section must be shown.

* * * * *

(e) The windshield and side windows forward of the pilot's back when the pilot is seated in the normal flight position must have a luminous transmittance value of not less than 70 percent.

* * * * *

(h) In addition, for commuter category airplanes, the following applies:

(1) Windshield panes directly in front of the pilots in the normal conduct of their duties, and the supporting structures for these panes must withstand, without penetration, the impact of a two-pound bird when the velocity of the airplane (relative to the bird along the airplane's flight path) is equal to the airplane's maximum approach flap speed.

(2) The windshield panels in front of the pilots must be arranged so that, assuming the loss of vision through any one panel, one or more panels remain available for use by a pilot seated at a pilot station to permit continued safe flight and landing.

13. Section 23.783 is amended by revising paragraph (b) and by adding a new paragraph (f) to read as follows:

§ 23.783 Doors.

* * * * *

(b) Passenger doors must not be located with respect to any propeller disk or any other potential hazard so as to endanger persons using that door.

* * * * *

(f) If lavatory doors are installed, they must be designed to preclude an occupant from becoming trapped inside the lavatory. If a locking mechanism is installed, it must be capable of being unlocked from outside of the lavatory.

14. Section 23.785 is amended by adding introductory text and by revising paragraph (b) to read as follows:

§ 23.785 Seats, berths, litters, safety belts and shoulder harnesses.

There must be a seat or berth for each occupant that meets the following:

* * * * *

(b) Each forward-facing or aft-facing seat/restraint system in normal, utility, or acrobatic category airplanes must consist of a seat, a safety belt, and a shoulder harness, with a metal-to-metal latching device as required by § 23.1413, that are designed to provide the occupant protection provisions required in § 23.562. Other seat orientations must provide the same level of occupant protection as a forward-facing or aft-facing seat with a safety belt and a shoulder harness, and must provide the protection provisions of § 23.562.

* * * * *

15. Section 23.787 is revised to read as follows:

§ 23.787 Baggage and cargo compartments.

(a) Each baggage and cargo compartment must:

(1) Be designed for its placarded maximum weight of contents and for the critical load distributions at the appropriate maximum load factors corresponding to the flight and ground load conditions of this part.

(2) Have means to prevent the contents of any compartment from becoming a hazard by shifting, and to protect any controls,

wiring, lines, equipment or accessories whose damage or failure would affect safe operations.

(3) Have a means to protect occupants from injury by the contents of any compartment, located aft of the occupants and separated by structure, when the ultimate forward inertial load factor is 9g and assuming the maximum allowed baggage or cargo weight for the compartment.

(b) Designs that provide for baggage or cargo to be carried in the same compartment as passengers must have a means to protect the occupants from injury when the baggage or cargo is subjected to the inertial loads resulting from the ultimate static load factors of § 23.561(b)(3), assuming the maximum allowed baggage or cargo weight for the compartment.

(c) For airplanes that are used only for the carriage of cargo, the flightcrew emergency exits must meet the requirements of § 23.807 under any cargo loading conditions.

16. A new § 23.791 is added to read as follows:

§ 23.791 Passenger information signs.

For those airplanes in which the flightcrew members cannot observe the other occupants' seats or where the flightcrew members' compartment is separated from the passenger compartment, there must be at least one illuminated sign (using either letters or symbols) notifying all passengers when seat belts should be fastened. Signs that notify when seat belts should be fastened must:

(a) When illuminated, be legible to each person seated in the passenger compartment under all probable lighting conditions; and

(b) Be installed so that a flightcrew member can, when seated at the flightcrew member's station, turn the illumination on and off.

17. Section 23.807 is amended by revising paragraphs (b) and (b)(5) and by adding new paragraphs (a)(4) and (b)(6) to read as follows:

§ 23.807 Emergency exits.

(a) * * *

(4) Emergency exits must not be located with respect to any propeller disk or any other potential hazard so as to endanger persons using that exit.

(b) Type and operation. Emergency exits must be movable windows, panels, canopies, or external doors, openable from both inside and outside the airplane, that provide a clear and unobstructed opening large enough to admit a 19-by-26-inch ellipse. Auxiliary locking devices used to secure the airplane must be designed to be overridden by the normal internal opening means. The inside handles of emergency exits that open outward must be adequately protected against inadvertent operation. In addition, each emergency exit must--

* * * * *

(5) In the case of acrobatic category airplanes, allow each occupant to abandon the airplane at any speed between V_{SO} and V_D; and

(6) In the case of utility category airplanes certificated for spinning, allow each occupant to abandon the airplane at the

highest speed likely to be achieved in the maneuver for which the airplane is certificated.

* * * * *

§ 23.841 [Amended]

18. Section 23.841 is amended by revising paragraph (a) by removing the number "31,000" and replacing it with "25,000".

19. Section 23.853 is amended by revising the section heading to read:

§ 23.853 Passenger and crew compartment interiors.

* * * * *

20. A new § 23.855 is added to read as follows:

§ 23.855 Cargo and baggage compartment fire protection.

(a) Sources of heat within each cargo and baggage compartment that are capable of igniting the compartment contents must be shielded and insulated to prevent such ignition.

(b) Each cargo and baggage compartment must be constructed of materials that meet the appropriate provisions of § 23.853(d)(3).

(c) In addition for commuter category airplanes, each cargo and baggage compartment must:

(1) Be located where the presence of a fire would be easily discovered by the pilots when seated at their duty station, or it must be equipped with a smoke or fire detector system to give a warning at the pilots' station, and provide sufficient access to

enable a pilot to effectively reach any part of the compartment with the contents of a hand held fire extinguisher, or

(2) Be equipped with a smoke or fire detector system to give a warning at the pilots' station and have ceiling and sidewall liners and floor panels constructed of materials that have been subjected to and meet the 45 degree angle test of Appendix F of this part. The flame may not penetrate (pass through) the material during application of the flame or subsequent to its removal. The average flame time after removal of the flame source may not exceed 15 seconds, and the average glow time may not exceed 10 seconds. The compartment must be constructed to provide fire protection that is not less than that required of its individual panels; or

(3) Be constructed and sealed to contain any fire within the compartment.

21. Section 23.867 is amended by revising the heading that precedes the section and the section heading to read as follows:

ELECTRICAL BONDING AND LIGHTNING PROTECTION

§ 23.867 Electrical bonding and protection against lightning and static electricity.

* * * * *

22. Section 23.1303 is amended by revising the introductory paragraph; by revising paragraph (d) by inserting the words "reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight and" between the words "For" and "turbine" at the beginning of this paragraph; by revising paragraph (e)(2) by adding

a line to the flush paragraph to read, "The lower limit of the warning device must be set to minimize nuisance warning;" and by adding new paragraphs (f) and (g) to read as follows:

§ 23.1303 Flight and navigation instruments.

The following are the minimum required flight and navigation instruments:

* * * * *

(f) When an attitude display is installed, the instrument design must not provide any means, accessible to the flightcrew, of adjusting the relative positions of the attitude reference symbol and the horizon line beyond that necessary for parallax correction.

(g) In addition, for commuter category airplanes:

(1) If airspeed limitations vary with altitude, the airspeed indicator must have a maximum allowable airspeed indicator showing the variation of V_{MO} with altitude.

(2) The altimeter must be a sensitive type.

(3) Having a passenger seating configuration of 10 or more, excluding the pilot's seats and that are approved for IFR operations, a third attitude instrument must be provided that:

(i) Is powered from a source independent of the electrical generating system;

(ii) Continues reliable operation for a minimum of 30 minutes after total failure of the electrical generating system;

(iii) Operates independently of any other attitude indicating system;

(iv) Is operative without selection after total failure of the electrical generating system;

(v) Is located on the Instrument panel in a position acceptable to the Administrator that will make it plainly visible to and usable by any pilot at the pilot's station; and

(vi) Is appropriately lighted during all phases of operation.

§ 23.1307 [Amended]

23. Section 23.1307 is amended by removing paragraphs (a) and (b); and by removing the designation from paragraph (c).

24. Section 23.1309 is amended by adding a new paragraph (a)(4) to read as follows:

§ 23.1309 Equipment, systems, and installations.

(a) * * *

(4) In a commuter category airplane, must be designed to safeguard against hazards to the airplane in the event of their malfunction or failure.

* * * * *

25. Section 23.1311 is revised to read as follows:

§ 23.1311 Electronic display instrument systems.

(a) Electronic display indicators, including those with features that make isolation and independence between powerplant instrument systems impractical, must:

(1) Meet the arrangement and visibility requirements of § 23.1321.

(2) Be easily legible under all lighting conditions encountered in the cockpit, including direct sunlight, considering

the expected electronic display brightness level at the end of an electronic display indicator's useful life. Specific limitations on display system useful life must be contained in the Instructions for Continued Airworthiness required by § 23.1529.

(3) Not inhibit the primary display of attitude, airspeed, altitude, or powerplant parameters needed by any pilot to set power within established limitations, in any normal mode of operation.

(4) Not inhibit the primary display of engine parameters needed by any pilot to properly set or monitor powerplant limitations during the engine starting mode of operation.

(5) Have an independent magnetic direction indicator and either an independent secondary mechanical altimeter, airspeed indicator, and attitude instrument or individual electronic display indicators for the altimeter, airspeed, and attitude indicator that are independent from the airplane's primary electrical power system. These secondary instruments may be installed in panel positions that are displaced from the primary positions specified by § 23.1321(d), but must be located where they meet the pilots' visibility requirements of § 23.1321(a).

(6) Incorporate sensory cues for the pilot that are equivalent to those in the instrument being replaced by the electronic display indicators.

(7) Incorporate visual displays of instrument markings, required by §§ 23.1541 through 23.1553, or visual displays that alert the pilot to abnormal operational values or approaches to established limitation values, for each parameter required to be displayed by this part.

(b) The electronic display indicators, including their systems and installations, and considering other airplane systems, must be designed so that one display of information essential for continued safe flight and landing will remain available to the crew, without need for immediate action by any pilot for continued safe operation, after any single failure or probable combination of failures.

(c) As used in this section, "instrument" includes devices that are physically contained in one unit, and devices that are composed of two or more physically separate units or components connected together (such as a remote indicating gyroscopic direction indicator that includes a magnetic sensing element, a gyroscopic unit, an amplifier, and an indicator connected together). As used in this section, "primary" display refers to the display of a parameter that is located in the instrument panel such that the pilot looks at it first when wanting to view that parameter.

§ 23.1321 [Amended]

26. Section 23.1321 is amended by removing the words "certificated for flight under instrument flight rules or of more than 6,000 pounds maximum weight" from paragraph (d).

27. Section 23.1323 is amended by redesignating paragraphs (c), (d), and (e) as (e), (f), and (d), respectively; by removing the words "in flight and" from the first sentence of redesignated

paragraph (e); and by adding new paragraphs (c) and (g) to read as follows:

§ 23.1323 Airspeed indicating system.

* * * * *

(c) The design and installation of each airspeed indicating system must provide positive drainage of moisture from the pitot static plumbing.

* * * * *

(g) For commuter category airplanes, where duplicate airspeed indicators are required, their respective pitot tubes must be far enough apart to avoid damage to both tubes in a collision with a bird.

§ 23.1325 [Amended]

28. Section 23.1325 is amended by inserting the words "or icing" between the words "meteorological" and "conditions" in paragraph (g).

29. A new § 23.1326 is added to read as follows:

§ 23.1326 Pitot heat indication systems.

If a flight instrument pitot heating system is installed to meet the requirements specified in § 23.1323(d), an indication system must be provided to indicate to the flight crew when that pitot heating system is not operating. The indication system must comply with the following requirements:

(a) The indication provided must incorporate an amber light that is in clear view of a flightcrew member.

(b) The indication provided must be designed to alert the flight crew if either of the following conditions exist:

(1) The pitot heating system is switched "off".

(2) The pitot heating system is switched "on" and any pitot tube heating element is inoperative.

§ 23.1329 [Amended]

30. Section 23.1329(b) is amended by adding the parenthetical phrase "(both stick controls, if the airplane can be operated from either pilot seat)" between the words, "or on the stick control," and the word "such".

31. Section 23.1337 is amended by revising the section heading, by revising the introductory text of paragraph (b), by redesignating paragraphs (b)(4) and (b)(5) as paragraph (b)(5) and (b)(6), respectively, and by adding a new paragraph (b)(4) to read as follows:

§ 23.1337 Powerplant instruments installation.

* * * * *

(b) Fuel quantity indication. There must be a means to indicate to the flightcrew members the quantity of usable fuel in each tank during flight. An indicator calibrated in appropriate units and clearly marked to indicate those units must be used. In addition:

* * * * *

(4) There must be a means to indicate the amount of usable fuel in each tank when the airplane is on the ground (such as by a stick gauge);

* * * * *

32. Section 23.1351 is amended by removing paragraph (b)(4), by redesignating paragraph (b)(5) as (b)(4), by adding a sentence to the end of paragraph (f) that reads, "The external power connection must be located so that its use will not result in a hazard to the airplane or ground personnel", and by revising paragraphs (b)(2), (b)(3), and (c)(3) to read as follows:

§ 23.1351 General.

* * * * *

(b) * * *

(2) Electric power sources must function properly when connected in combination or independently.

(3) No failure or malfunction of any electric power source may impair the ability of any remaining source to supply load circuits essential for safe operation.

* * * * *

(c) * * *

(3) Automatic means must be provided to prevent either damage to any generator/alternator or adverse effects on the airplane electrical system due to reverse current. A means must also be provided to disconnect each generator/alternator from the battery and other generators/alternators.

* * * * *

33. Section 23.1353 is amended by adding a new paragraph (h) to read as follows:

§ 23.1353 Storage battery design and installation.

* * * * *

(h) In the event of a complete loss of the primary electrical power generating system, the battery must be capable of providing at least 30 minutes of electrical power to those loads that are essential to continued safe flight and landing. The 30 minute time period includes the time needed for the pilots to recognize the loss of generated power and take appropriate load shedding action.

34. A new § 23.1359 is added to read as follows:

§ 23.1359 Electrical system fire protection.

(a) Each component of the electrical system must meet the applicable fire protection requirements of §§ 23.863 and 23.1182.

(b) Electrical cables, terminals, and equipment in designated fire zones that are used during emergency procedures must be fire-resistant.

(c) Insulation on electrical wire and electrical cable must be self-extinguishing when tested at an angle of 60 degrees in accordance with the applicable portions of Appendix F of this part, or other approved equivalent methods. The average burn length must not exceed 3 inches (76 mm) and the average flame time after removal of the flame source must not exceed 30 seconds. Drippings from the test specimen must not continue to flame for more than an average of 3 seconds after falling.

§ 23.1361 [Amended]

35. Section 23.1361(c) is amended by removing the last two words "in flight".

36. Section 23.1365 is amended by revising paragraph (b) and by adding new paragraphs (d), (e), and (f) to read as follows:

§ 23.1365 Electrical cables and equipment.

* * * * *

(b) Any equipment that is associated with any electrical cable installation and that would overheat in the event of circuit overload or fault must be flame resistant. That equipment and the electrical cables must not emit dangerous quantities of toxic fumes.

* * * * *

(d) Means of identification must be provided for electrical cables, terminals, and connectors.

(e) Electrical cables must be installed such that the risk of mechanical damage and/or damage caused by fluids, vapors, or sources of heat, is minimized.

(f) Where a cable cannot be protected by a circuit protection device or other overload protection, it must not cause a fire hazard under fault conditions.

37. Section 23.1383 is revised to read as follows:

§ 23.1383 Taxi and landing lights.

Each taxi and landing light must be designed and installed so that:

(a) No dangerous glare is visible to the pilots.

(b) The pilot is not seriously affected by halation.

(c) It provides enough light for night operations.

(d) It does not cause a fire hazard in any configuration.

38. Section 23.1401 is amended by revising the introductory text of paragraph (a) to read as follows:

§ 23.1401 Anticollision light system.

(a) General. The airplane must have an anticollision light system that:

* * * * *

39. Section 23.1431 is amended by adding new paragraphs (c), (d), and (e) to read as follows:

§ 23.1431 Electronic equipment.

* * * * *

(c) For those airplanes required to have more than one flightcrew member, or whose operation will require more than one flightcrew member, the cockpit must be evaluated to determine if the flightcrew members, when seated at their duty station, can converse without difficulty. If the airplane design includes provision for the use of communication headsets, the evaluation must also consider conditions where headsets are being used. If the evaluation shows conditions under which it will be difficult to converse, an intercommunication system must be provided.

(d) If installed communication equipment includes transmitter "off-on" switching, that switching means must be designed to return from the "transmit" to the "off" position when it is released and ensure that the transmitter will return to the off (non transmitting) state.

(e) If provisions for the use of communication headsets are provided, it must be demonstrated that the flightcrew members will receive all aural warnings when any headset is being used.

40. Section 23.1435 is amended by revising paragraph (c) to read as follows:

§ 23.1435 Hydraulic systems.

* * * * *

(c) Accumulators. A hydraulic accumulator or reservoir may be installed on the engine side of any firewall if--

(1) It is an integral part of an engine or propeller system, or

(2) The reservoir is nonpressurized and the total capacity of all such nonpressurized reservoirs is one quart or less.

41. Section 23.1447 is amended by revising paragraphs (d) and (e) and by adding a new paragraph (a)(4) to read as follows:

§ 23.1447 Equipment standards for oxygen dispensing units.

* * * * *

(a) * * *

(4) If radio equipment is installed, the flightcrew oxygen dispensing units must be designed to allow the use of that

equipment and to allow communication with any other required crew member while at their assigned duty station.

* * * * *

(d) For a pressurized airplane designed to operate at flight altitudes above 25,000 feet (MSL), the dispensing units must meet the following:

(1) The dispensing units for passengers must be connected to an oxygen supply terminal and be immediately available to each occupant wherever seated.

(2) The dispensing units for crewmembers must be automatically presented to each crewmember before the cabin pressure altitude exceeds 15,000 feet, or the units must be of the quick-donning type, connected to an oxygen supply terminal that is immediately available to crewmembers at their station.

(e) If certification for operation above 30,000 feet is requested, the dispensing units for passengers must be automatically presented to each occupant before the cabin pressures altitude exceeds 15,000 feet.

* * * * *

42. A new § 23.1451 is added to read as follows:

§ 23.1451 Fire protection for oxygen equipment.

Oxygen equipment and lines must:

(a) Not be installed in any designated fire zones.

(b) Be protected from heat that may be generated in, or escape from, any designated fire zone.

(c) Be installed so that escaping oxygen cannot come in contact with and cause ignition of grease, fluid, or vapor accumulations that are present in normal operation or that may result from the failure or malfunction of any other system.

43. A new § 23.1453 is added to read as follows:

§ 23.1453 Protection of oxygen equipment from rupture.

(a) Each element of the oxygen system must have sufficient strength to withstand the maximum pressure and temperature, in combination with any externally applied loads arising from consideration of limit structural loads, that may be acting on that part of the system.

(b) High pressure oxygen sources and the lines between the source and the shutoff means must be:

(1) Protected from unsafe temperatures; and

(2) Located where the probability and hazard of rupture in a crash landing are minimized.

44. Section 23.1461 is amended by revising paragraph (a) to read as follows:

§ 23.1461 Equipment containing high energy rotors.

(a) Equipment, such as Auxiliary Power Units (APU) and constant speed drive units, containing high energy rotors must meet paragraphs (b), (c), or (d) of this section.

* * * * *

45. Appendix F is amended by revising the introductory paragraph, by amending paragraph (c) to change the reference from paragraph (e) to paragraph (g), by amending paragraph (d) to change the reference from paragraph (f) to paragraph (h), by redesignating current paragraph (f) as paragraph (h), and by revising paragraph (b) and adding new paragraphs (f) and (g) to read as follows:

APPENDIX F TO PART 23--TEST PROCEDURE

An acceptable test procedure for self-extinguishing materials for showing compliance with §§ 23.853, 23.855 and 23.1359.

* * * * *

(b) Specimen configuration. Except as provided for materials used in electrical wire and cable insulation and in small parts, materials must be tested either as a section cut from a fabricated part as installed in the airplane or as a specimen simulating a cut section, such as: a specimen cut from a flat sheet of the material or a model of the fabricated part. The specimen may be cut from any location in a fabricated part; however, fabricated units, such as sandwich panels, may not be separated for a test. The specimen thickness must be no thicker than the minimum thickness to be qualified for use in the airplane, except that: (1) thick foam parts, such as seat cushions, must be tested in 1/2-inch thickness; (2) when showing compliance with § 23.853(d)(3)(v) for materials used in small parts that must be tested, the materials must be tested in no more than 1/8-inch thickness; (3) when showing compliance with § 23.1359(c) for materials used in electrical wire and cable insulation, the wire and cable specimens must be the same size as used in the airplane. In the case of fabrics, both the

warp and fill direction of the weave must be tested to determine the most critical flammability conditions. When performing the tests prescribed in paragraphs (d) and (e) of this appendix, the specimen must be mounted in a metal frame so that (1) in the vertical tests of paragraph (d) of this appendix, the two long edges and the upper edge are held securely; (2) in the horizontal test of paragraph (e) of this appendix, the two long edges and the edge away from the flame are held securely; (3) the exposed area of the specimen is at least 2 inches wide and 12 inches long, unless the actual size used in the airplane is smaller; and (4) the edge to which the burner flame is applied must not consist of the finished or protected edge of the specimen but must be representative of the actual cross section of the material or part installed in the airplane. When performing the test prescribed in paragraph (f) of this appendix, the specimen must be mounted in a metal frame so that all four edges are held securely and the exposed area of the specimen is at least 8 inches by 8 inches.

* * * * *

(f) Forty-five degree test. A minimum of three specimens must be tested and the results averaged. The specimens must be supported at an angle of 45 degrees to a horizontal surface. The exposed surface when installed in the aircraft must be face down for the test. The specimens must be exposed to a Bunsen or Tirrill burner with a nominal 3/8-inch I.D. tube adjusted to give a flame of 1-1/2 inches in height. The minimum flame temperature measured by a calibrated thermocouple pyrometer in the center of the flame must be 1550°F. Suitable precautions must be taken to avoid

drafts. The flame must be applied for 30 seconds with one-third contacting the material at the center of the specimen and then removed. Flame time, glow time, and whether the flame penetrates (passes through) the specimen must be recorded.

(g) Sixty-degree test. A minimum of three specimens of each wire specification (make and size) must be tested. The specimen of wire or cable (including insulation) must be placed at an angle of 60 degrees with the horizontal in the cabinet specified in paragraph (c) of this appendix, with the cabinet door open during the test or placed within a chamber approximately 2 feet high x 1 foot x 1 foot, open at the top and at one vertical side (front), that allows sufficient flow of air for complete combustion but is free from drafts. The specimen must be parallel to and approximately 6 inches from the front of the chamber. The lower end of the specimen must be held rigidly clamped. The upper end of the specimen must pass over a pulley or rod and must have an appropriate weight attached to it so that the specimen is held tautly throughout the flammability test. The test specimen span between lower clamp and upper pulley or rod must be 24 inches and must be marked 8 inches from the lower end to indicate the central point for flame application. A flame from a Bunsen or Tirrill burner must be applied for 30 seconds at the test mark. The burner must be mounted underneath the test mark on the specimen, perpendicular to the specimen and at an angle of 30 degrees to the vertical plane of the specimen. The burner must have a nominal bore of three-eighths inch, and must be adjusted to provide a three-inch-high flame with an inner cone approximately one-third of

the flame height. The minimum temperature of the hottest portion of the flame, as measured with a calibrated thermocouple pyrometer, may not be less than 1,750°F. The burner must be positioned so that the hottest portion of the flame is applied to the test mark on the wire. Flame time, burn length, and flaming time of drippings, if any, must be recorded. The burn length determined in accordance with paragraph (h) of this appendix must be measured to the nearest one-tenth inch. Breaking of the wire specimen is not considered a failure.

* * * * *

PART 91--GENERAL OPERATING AND FLIGHT RULES

46. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 1301(7), 1303, 1344, 1348, 1352 through 1355, 1401, 1421 through 1431, 1471, 1472, 1502, 1510, 1522, and 2121 through 2125; Articles 12, 29, 21, and 32(a) of the Convention on International Civil Aviation (61 Stat. 1180); 42 U.S.C. 4321 et seq.; E.O. 11514; 49 U.S.C. 106(g).

47. Section 91.205 is amended by redesignating paragraphs (b)(11) through (b)(16) as paragraphs (b)(12) through (b)(17), respectively, and by adding a new paragraph (b)(11) to read as follows:

§ 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.

* * * * *

(b) * * *

(11) For small civil airplanes certificated after (INSERT DATE OF THIS AMENDMENT), in accordance with part 23, as amended by amendment 23-(INSERT AMENDMENT NUMBER), an approved aviation red or aviation white anticollision light system. In the event of failure of any light of the anticollision light system, operation of the aircraft may continue to a location where repairs or replacement can be made.

* * * * *

48. Section 91.209 is amended by revising it to read as follows:

§ 91.209 Aircraft lights.

No person may:

(a) During the period from sunset to sunrise (or, in Alaska, during the period a prominent unlighted object cannot be seen from a distance of 3 statute miles or the sun is more than 6 degrees below the horizon)--

(1) Operate an aircraft unless it has lighted position lights;

(2) Park or move an aircraft in, or in dangerous proximity to, a night flight operations area of an airport unless the aircraft--

(i) Is clearly illuminated;

(ii) Has lighted position lights; or

(iii) Is in an area that is marked by obstruction lights;

(3) Anchor an aircraft unless the aircraft--

(i) Has lighted anchor lights; or

(ii) Is in an area where anchor lights are not required on vessels; or

(b) Operate an aircraft that is equipped with an anticollision light system, unless it has lighted anticollision lights. However, the anticollision lights need not be lighted when the pilot-in-command determines that, because of operating conditions, it would be in the interest of safety to turn the lights off.

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OFFICE OF AVIATION POLICY, PLANS, AND MANAGEMENT ANALYSIS

REGULATORY EVALUATION, REGULATORY FLEXIBILITY DETERMINATION, AND TRADE IMPACT ASSESSMENT

PARTS 23 AND 91; SYSTEMS AND EQUIPMENT PROPOSALS BASED ON EUROPEAN JOINT AVIATION REQUIREMENTS PROPOSALS

Don Glasco and Marilyn DonCarlos

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EXECUTIVE SUMMARY

This regulatory evaluation examines the impacts of a proposed rule to amend parts 23 and 91 of the Federal Aviation Regulations (FAR). The proposed rule would provide more uniform systems airworthiness standards for airplanes certificated in the United States and in the member countries of the European Joint Aviation Authorities (JAA). The part 23 airworthiness review effort includes four notices addressing systems, powerplants, flight, and airframes. This evaluation examines the impacts of the systems proposal.

Many of the provisions in this proposal would impose either no cost or a negligible cost. Such provisions are typically administrative, editorial, clarifying, relieving, or conforming in nature. In addition, the FAA holds that certain provisions have a potential safety benefit that can be achieved with no incremental cost; due primarily to the fact that this rule would apply to future certificated airplanes and retrofitting would not be required.

For 20 of the 46 sections that would be amended, the proposed rule would impose non-negligible costs to the affected airplane models. It is emphasized that many of these provisions would not impose costs on all part 23 airplanes. The single most costly provision of the proposed rule addresses the bird strike resistance standards for commuter airplane windshields. This provision could impose incremental costs as high as $907,000 per certification, $9,500 per production airplane, and $547 in additional annual operating costs per airplane.

The FAA holds that the benefits of the proposed rule, though not all directly

quantifiable, would exceed the expected costs. Each of the provisions, as well as the entire proposal, would be cost beneficial. The proposed amendments would not have a significant economic impact on a substantial number of small entities. In addition, the proposed rule would not constitute a barrier to international trade.

AIRWORTHINESS STANDARDS; SYSTEMS AND EQUIPMENT PROPOSALS BASED ON EUROPEAN JOINT AVIATION REQUIREMENTS PROPOSALS

I. Introduction

This regulatory evaluation examines the impacts of a proposed rule to amend parts 23 and 91 of the Federal Aviation Regulations (FAR). The proposed rule would amend the systems airworthiness standards for normal, utility, acrobatic, and commuter category airplanes. The proposals result from a joint effort between the FAA and the European Joint Aviation Authorities (JAA) to harmonize the FAR and the JAA's Joint Aviation Requirements (JAR). The proposed changes would provide more uniform systems airworthiness standards for airplanes certificated in the United States and the JAA member countries. The resulting greater uniformity of standards would simplify airworthiness approval for import and export purposes.

II. Background

At the June 1990 meeting between the JAA Council and the FAA, the FAA Administrator committed the agency to support the harmonization of the FAR with the JAR, which was being developed for use by the JAA member authorities in Europe. In response to this commitment, the FAA's Small Airplane Directorate established the Harmonization Task Force to work with the JAR 23 Study Group. The General Aviation Manufacturers Association (GAMA) also established a JAR/FAR 23 committee to provide

technical assistance in this effort.

In October 1990, a meeting was held to discuss the first draft of the proposed JAR 23. Participants included representatives from the FAA Harmonization Task Force, the GAMA Committee, the JAR 23 Study Group, and the Association Europeenne des Constructeures de Material Aerospatial (AECMA), an organization of European airframe manufacturers. Following that meeting, technical representatives from each of the four organizations met on several occasions to resolve differences between the proposed JAR and the FAR.

During this effort, the FAA established the Aviation Rulemaking Advisory Committee (ARAC) which held its first meeting in May 1991. The General Aviation and Business Airplane (GABA) Subcommittee was established at that meeting to provide advice and recommendations regarding the airworthiness standards of part 23 of the FAR and the related operating provisions of parts 91 and 135.

In June 1992, the FAA assigned to the GABA Subcommittee those rulemaking projects related to JAR/FAR 23 harmonization. In turn, the GABA Subcommittee established the JAR/FAR 23 Harmonization Working Group and charged it with making recommendations concerning the FAA's disposition of the pertinent rulemakings. The group held its first meeting in February 1993.

Following completion of these harmonization activities, the FAA

determined that the proposed revisions to part 23 were too numerous for a single notice. The FAA decided that public participation would be better served by issuing four notices to address separately the airworthiness standards for systems, powerplants, flight, and airframes. This evaluation examines the impacts of the systems proposal.

III. Description and Evaluation of the Proposed Rule

This chapter describes the incremental effect of each proposed revision in the proposal. The descriptions and evaluations are numerically ordered by FAR section.

Section 23.75 Landing. The proposed rule would, without substantive change, relocate the requirements of § 23.75(e) to § 23.735(c), Brakes. This requirement states that the wheel brake pressures used during the landing distance determination may not exceed the pressure specified by the brake manufacturer. Since pilots cannot ensure that a limit on the brake pressure is not exceeded during performance testing of the airplane, the brake system must be designed to ensure that the manufacturer's specified brake pressures are not exceeded when the brakes are applied. Accordingly, this requirement is more appropriately located in the brake requirements of § 23.735.

No costs are attributed to this provision. The existing requirement would merely be moved to a more appropriate section.

Section 23.677 Trim systems. The proposed revision to § 23.677(a) would clarify the need to mark the neutral trim position on the lateral and directional trim indicators. The trim indicators on most airplanes are currently marked with the neutral position of the trimming device. This proposal would standardize the cockpit markings for all airplanes.

Revised paragraph (a) would also add a requirement that the pitch trim indicator be marked with the proper pitch trim range for takeoff. Takeoff accidents, including some involving fatalities, have occurred because the pitch trim was not set within the proper range needed for takeoff. As a result of this accident experience, most airplane manufacturers now mark the pitch trim indicator with the appropriate range for takeoff.

Insignificant incremental costs are attributed to the proposed requirements in this section. The trim indicators on most current production airplanes already have the markings necessary to comply with the proposal. For those airplanes that would not otherwise be in compliance, a simple, inexpensive mark on the indicators would be required. The benefit of these provisions is a reduction of the potential accidents caused by attempting a takeoff with an improperly set trim device.

Section 23.691 Artificial stall barrier system. This proposed new section would provide standards for stall barrier systems if a stall barrier is necessary to show compliance with §23.201(c) which provides

criteria for the in-flight demonstration of a wings-level stall. The proposed section would also specify the means of identifying when a stall has occurred.

The FAA amended § 23.201(c) (58 FR 42136, August 6, 1993) as part of the Small Airplane Review Program. That revision recognized the installation of artificial stall barrier systems and necessitates the establishment of standards for such systems.

As design technology has improved and engines with increased power have become available, airplanes were developed that did not meet the older, wings-level stall requirement of § 23.201. These airplanes were equipped with an artificial stall barrier that moved the airplane elevator controls and caused a nose-down pitching motion similar to the pitching motion of airplanes that do meet the wings-level stall requirement of § 23.201. Stall barrier systems are commonly called "stick pushers." Compliance standards for these systems are currently established under the equivalent safety provisions of § 21.21(b)(1).

The provisions of the proposed new section are based on the stall barrier system design characteristics necessary for safe operation, including the prevention of unwanted activation which could cause an unsafe downward pitching motion at high airspeeds.

No incremental costs are attributed to this provision. The proposed rule would simply codify those provisions that have previously been

found necessary for approving "stick pusher" systems under the equivalent safety requirements of § 21.21(b)(1). In effect, no new requirements would be added by the proposed amendment. The provision would be cost relieving to the extent that administratively burdensome § 21.21(b)(1) equivalent safety procedures would be avoided.

Section 23.697 Wing flap controls. Proposed new § 23.697(c) would provide safety standards for the wing flap control lever designs installed in airplanes that use wing flap settings other than fully retracted when showing compliance with § 23.145. This revision is needed to ensure that the flap settings, which establish the safe operation of the airplane, can be positively selected.

The FAA estimates that an aerospace engineer could design the flap control lever to meet the proposed requirement in 8 hours at a burdened rate of $60 per hour, totalling $480 per certification. The control lever itself would impose an incremental cost, including installation, of approximately $100 per airplane.

The nominal benefits of this provision would derive from the increased safety afforded the pilot in positively selecting the proper flap setting to maintain longitudinal control. In fact, if a flap position other than fully retracted were needed to maintain longitudinal control: (1) that position would be necessary to prevent an unsafe condition, (2) the airplane would not be certificated under that design, and (3) the airplane would have to be redesigned so that intermediate flap

positions would not be needed for control. Proposed paragraph (c) would allow the identification of an intermediate flap position and the positive means of selecting that position. This alternative would rectify the unsafe condition without requiring the manufacturer to redesign the airplane.

Section 23.701 Flap interconnection. Section 23.701(a)(1) and (a)(2) would be revised to clarify the requirements for flap systems. Following the revision of § 23.701, as adopted by amendment 23-42 (56 FR 353, January 3, 1991), the FAA discovered that the new requirements could be interpreted in a way that could result in approval of airplanes with unsafe flight characteristics in the event of flap failure. To clarify the intent of the requirements the FAA issued a policy letter on March 14, 1991, to all aircraft certification offices providing guidance for the correct application of the requirements.

Since then, the FAA has reexamined the requirements and determined that § 23.701(a)(1) and (a)(2) need to be revised to prohibit conditions where a failure of the flap system could produce an asymmetric flap configuration. Under the proposal, these paragraphs would clarify that either: (1) the moveable flap surfaces must be synchronized by a mechanical interconnection, or by an approved equivalent means, that is independent of the flap drive system; or (2) the wing flap system must be designed so that any failure that would result in an unsafe flight characteristic of the airplane is extremely improbable.

No incremental costs are attributed to this provision. The proposal is a technical clarification of the existing intended standards for certification.

Section 23.703 Takeoff warning system. This proposed new section would require a takeoff warning system on some commuter category airplanes. The requirement would be applicable if the flight evaluation shows that an unsafe takeoff condition would result if lift devices or longitudinal trim devices are set to any position outside the approved takeoff range. If the evaluation shows that no unsafe condition would result at any setting of these devices, a takeoff warning system would not be required. For those airplanes on which a warning system must be installed, the proposed rule would provide requirements for the installation of the system.

The FAA estimates that an evaluation to determine whether a takeoff warning system would be needed would cost $240 (4 hours of engineering at a burdened rate of $60 per hour). Where needed, the integration design of a warning system would cost $2,400 (40 hours at $60 per hour). In addition, an incremental 4 hours of flight testing at a cost of $2,720[1] would be needed to demonstrate the system's performance. The FAA estimates that the system, including acquisition, wiring, micro switches, and labor, would add approximately $1,000 to the cost of each

[1] The FAA estimates that commuter category flight tests to validate the takeoff warning system would cost $500 per hour for two test pilots and $180 per hour for fuel (100 gallons per hour x $1.80 per gallon). Four hours of flight tests would cost $2,720.

airplane required to have one. Maintenance of such a system would cost approximately $100 per year. The FAA solicits comments from interested parties concerning the expected certifications that would require a takeoff warning system and the concomitant costs to acquire, install, and maintain them.

The nominal benefits of this proposal would derive from the increased safety provided by the takeoff warning system that would activate whenever lift or longitudinal trim devices are not set within their approved takeoff ranges. In fact, if an evaluation showed that positions of the lift or longitudinal trim devices could create an unsafe condition on takeoff, the manufacturer would be required, under existing regulations, to redesign the devices so that the unsafe positions could not be obtained. The proposed section would provide relief by allowing the applicant to install a warning system rather than redesigning the trim device(s).

Section 23.723 Shock absorption tests. Paragraph (b) of this section would be editorially corrected by changing the word "reserved" in the phrase "reserved energy absorption capacity" to "reserve."

No costs are attributed to this provision.

Section 23.729 Landing gear extension and retraction system. The proposed rule would amend paragraph (e) and add a new paragraph (g). The proposed revision to § 23.729(e) would clarify the existing

requirement that a landing gear indicator is required for each gear. In addition, the last sentence of the paragraph would be removed since it is advisory and should not be included in the requirements.

No costs are attributed to the proposed changes to § 23.729(e).

The proposed rule would also add a new § 23.729(g) requiring that if the landing gear bay is used as the location for any equipment other than the landing gear, such equipment must be designed and installed to minimize damage. Service history has shown that rocks, water, and slush enter the landing gear bay and can cause such damage. On larger airplanes, tire burst is the primary potential cause of damage to equipment in the landing gear bay.

Airplane manufacturers normally include protection for landing gear bay equipment and would likely continue to do so in future designs in the absence of the proposed requirement. Since the proposed provision formalizes current practice, incremental shielding costs, if any, would be negligible.

Section 23.735 Brakes. The proposed rule would revise the introductory text of paragraph (a) and would add new paragraphs (c) and (e). Section 23.735(a) would be editorially revised to state more simply that wheel brakes must be provided. In addition, the requirements in existing § 23.75(e) (discussed above) would be moved to proposed § 23.735(c).

No costs are attributed to the editorial revision of paragraph (a) or to the transfer of the provisions in § 23.75(e) to § 23.735(c).

Proposed new § 23.735(e), applicable to commuter category airplanes, would require establishing the minimum rejected takeoff brake kinetic energy capacity rating of each main wheel brake assembly. Based on the operating experience of airplanes used in passenger carrying operations, existing § 23.45 requires the determination of the accelerate-stop distance for commuter category airplanes. This proposed requirement is needed to ensure that the brakes will perform safely under accelerate-stop conditions.

Under the proposed rule, manufacturers of commuter airplanes could determine the kinetic energy absorption requirements either through a conservative rational analysis of the sequence of events expected during a rejected takeoff or by using a formula presented in proposed new § 23.735(e)(2). It is projected that the necessary determination would cost $240 based on four hours of engineering at a burdened rate of $60 per hour. The potential benefits of the proposal would derive from the added safety that would be provided by establishing beforehand the minimum necessary kinetic energy capacity rating of each main wheel brake assembly under rejected-takeoff conditions.

Section 23.745 Nose/Tail-wheel steering. Proposed new § 23.745 would provide the requirements for nose/tail-wheel steering. Advanced airplane design technology has produced several small airplanes that

employ a separate system for ground steering. The proposal would not require a separate ground steering system, but rather, would specify how the system should function if it is installed.

No incremental costs are attributed to this provision. In the absence of the proposed rule, the same or similar standards would continue to be applied to nose/tail-wheel steering systems through the special condition procedures of § 21.16.

Section 23.775 Windshields and windows. This section would be amended by revising paragraphs (a) and (c), and adding a new paragraph (h). Paragraph (a) would be revised to state that internal panels of windshields and windows must be constructed of a nonsplintering material, such as nonsplintering glass. Existing § 23.775(a) specifically requires nonsplintering safety glass. The proposed amendment recognizes and accommodates the development of suitable nonsplintering materials in addition to glass.

Paragraph (c) would be revised to clarify that it applies to pressurized airplanes certificated for operation up to and including 25,000 feet. This would not be a substantive change. The provisions of this paragraph have always applied to such airplanes but this applicability is not as clearly stated in the existing rule as it would be in the proposed rule.

No costs are attributed to the proposed revisions of paragraphs (a) and

(c).

Introductory text and paragraph (h)(1) would also be added to require that commuter category windshield panes that are directly in front of the pilots be able to withstand the impact of a two pound bird at maximum approach flap speed. By requiring full protection against the strike of a two-pound bird at approach speed, additional protection would also be provided if the airplane strikes a larger bird or strikes a bird at a higher speed.

Proposed § 23.775(h)(2) would further require the panels of the windshield to be so arranged that, if one is damaged, other panels would remain to provide visibility for continuous safe flight and landing.

The potential costs of proposed § 23.775(h) would vary depending on the circumstances of the affected manufacturer. Industry sources estimate that the total nonrecurring cost per model would range from $250,000 to $350,000, consisting of: (1) up to $200,000 for a bird strike test article ("bird gun") if the manufacturer does not have one; and (2) up to $150,000 of time and materials costs for the actual testing.

A manufacturer that has a bird strike test article would not incur additional capital test costs. Most manufacturers would incur up to $150,000 in time and materials costs for the actual testing, but even these costs would be mitigated by the existing need of most manufacturers to perform such tests for export sales to JAA member

countries.

Industry sources estimate that there would be no identifiable increment in design or tooling costs since the windshield would be an integral part of the initial design. Similarly, little or no recurring costs per airplane (incremental materials, installation, or weight) are projected since it is reasonable to assume that the pressure load, as compared to bird strike resistance, would be the controlling factor in the windshield design strength.

The benefit of the proposal rule is the incremental protection against bird strikes that would be afforded to commuter category airplanes. The FAA has reviewed International Civil Aviation Organization (ICAO) data on bird strikes that occurred on member-country airplanes of 19,000 pounds or less from 1981 through 1989. These data show that approximately 550 strikes occurred and that one out of seven strikes hit the windshield. The data show that:

1. Almost 52 percent of the strikes occurred at altitudes of less than 100 feet, and 26.7 percent occurred between 101 and 1000 feet.

2. Eighty-five percent of the strikes occurred at airspeeds of 150 knots or less.

3. Where bird types were reported, 27.6 percent of the strikes involved small birds and 58.6 involved medium size birds (2 pounds or less).

4. Incidents where the airplane was damaged showed that 16.9 percent resulted from small bird strikes and 64 percent resulted from medium size bird strikes.

These data show that most bird strikes occur at takeoff and landing altitudes and airspeeds, and that birds weighing two pounds or less are struck most often. The standards of the proposed provision are based on these statistics. Few fatalities and injuries resulted from the bird strikes reported in the ICAO data. Similarly, a review of NTSB accident records between 1982 and 1992 revealed no U.S. accidents resulting from bird strikes to the windshields of commuter category airplanes. As a result, the FAA is not able to illustrate the justification of this provision on the basis of historical accidents. Instead, the standards are being proposed based on the expert recommendations of the ARAC members. It is also noted that this standard will be applied in JAA member countries and that U.S. manufacturers wishing to export to those countries would be required to meet the standard in any event.

Given that this provision cannot be quantitatively supported on the basis of past accidents alone, the FAA expressly requests public input and comments on its expected costs and potential benefits.

Section 23.783 Doors. Current § 23.783(b) requires that passenger doors not be located with respect to any propeller disk so as to endanger persons using the door. Proposed paragraph (b) would add that passenger doors must not be located with respect to any other potential

hazard that could endanger persons using the door. The propeller disk remains the prominent hazard but other items, such as hot deicer surfaces, heated pitot tubes, or sharp objects on the airplane structure, could also pose hazards.

The FAA holds that no incremental cost would be incurred to meet the standards of the proposed provision for newly certificated airplanes.

Proposed new paragraph (f) would require that the locks on lavatory doors, if installed, be designed so that they would not trap occupants. Lavatory door locks used in transport category airplanes (see § 25.783) meet the requirements of this proposed rule. The FAA estimates that the incremental cost of this provision would be no more than $25 per lock. The proposal would reduce the likelihood that occupants would be trapped in a locked lavatory, both in emergency and nonemergency situations.

Section 23.785 Seats, berths, litters, safety belts and shoulder harnesses. The seat requirements of part 23 would be clarified by moving the provisions of current § 23.1307(a), which require a seat or berth for each occupant, to the introductory text of § 23.785. The requirement of § 23.1413, for a metal to metal latching device for seat belts and shoulder harnesses, would also be included in § 23.785(b). These proposed changes would combine existing, related seat requirements into one section.

No costs are attributed to these organizational provisions.

Section 23.787 Baggage and cargo compartments. Section 23.787 would be revised by extending certain existing cargo compartment requirements to baggage compartments. The proposed baggage compartment provisions are already required for commuter category airplanes under current § 23.787(g) and would be extended to non-commuter airplanes under the proposal. As proposed: (1) future baggage compartments would have to be placarded for their maximum weight capacity; (2) there must be a means to prevent baggage from shifting; and (3) there must be a means to protect controls, wiring, lines, equipment or accessories that are located in the compartment and whose damage or failure would affect safe operation of the airplane.

The FAA holds that no incremental cost would be incurred to meet the proposed requirement to protect controls, wiring, lines, equipment or accessories in baggage and cargo compartments. Such protection is a common design practice.

The proposed revision to section § 23.787(a) would add a placard requirement for baggage compartments in normal, utility, and acrobatic airplanes. The weight and balance for the entire airplane, including the maximum allowable baggage compartment weight is currently required to be computed under § 23.23. The only incremental costs would be those for placarding the baggage compartment. The cost of a placard stating the maximum weight allowed in the baggage compartment would be negligible ($1).

The proposed rule would extend to normal, utility, and acrobatic airplanes the existing commuter requirement to prevent baggage from hazardous shifting. The FAA estimates that an aerospace engineer would be required for 1 hour, at a burdened cost of $60 per hour, to analyze the subject loads that would need to be constrained. Tiedowns would cost approximately $50 per baggage compartment, or no more than $100 per airplane. These additional costs would only apply to normal, utility, or acrobatic airplanes since commuter category airplanes are already subject to the requirement under the existing rule.

The potential benefits of the proposed provision include the reduced likelihood: (1) that baggage compartments would be overloaded, (2) that stowed baggage would shift dangerously, and (3) that essential co-located equipment or wiring would be damaged.

The proposed rule would also move the substance of paragraphs (d) and (f) to a proposed new § 23.855, which would address cargo and baggage compartment fire protection. In addition, proposed new paragraph (c) would clarify that the flightcrew emergency exits on all cargo configured airplanes must meet the requirements of § 23.807 under any cargo loading condition. This is not a new requirement since § 23.807 already requires that each emergency exit be readily accessible.

No costs are attributed to the proposed transfer of the substance of existing paragraphs (d) and (f) to proposed new § 23.855, or to the clarifying emphasis in proposed new paragraph (c).

Section 23.791 Passenger information signs. This proposed new section would require at least one illuminated sign notifying all passengers when seat belts should be fastened. The requirement would only apply to airplanes where flightcrew members could not observe occupant seats or where the flightcrew compartment is separated from the passenger compartment. The signs would have to be legible to all seated passengers and be operable from a crewmember station.

The FAA estimates that an aerospace engineer could design the required sign(s) in 1 hour, at a burdened rate of $60 per hour. The sign would cost approximately $200 per airplane, including parts and installation costs. Maintenance costs for bulb replacement would be negligible. The weight penalty associated with the light system would also be minor (no more than 2 pounds).

The safety benefits of the proposed change would derive from the increased likelihood that passengers would know when their seat belts should be fastened.

Section 23.807 Emergency exits. Proposed new § 23.807(a)(4) would provide the same hazard protection for a person using an emergency exit as that provided by proposed § 23.783(b) for a person who uses a passenger door. Emergency exits could not be located with respect to a propeller disk or any other hazard in a manner that would endanger persons using that exit.

The FAA holds that no incremental cost would be incurred to meet the standards of the proposed provision for newly certificated airplanes. However, this notice specifically requests that interested parties submit comments on the potential costs and methods of compliance that manufacturers would choose to comply with this proposed requirement.

Proposed new § 23.807(b) would provide that the inside handles of emergency exits that open outward must be protected against inadvertent operation. Currently this protection is required by applying the general safety requirements of part 23. The addition of the specific requirement in § 23.807(b) would clarify the need for this protection by providing a specific requirement.

No actual incremental safety benefits or costs are attributed to this proposal since the protection against inadvertent operation is currently required, and in the absence of this rule would continue to be required. The proposed change would clarify and emphasize an existing safety requirement.

The proposed revision to § 23.807(b)(5) would editorially revise the current egress requirements for acrobatic airplanes. New § 23.807(b)(6) would establish similar egress standards for utility category airplanes that are certificated for spinning. Industry sources estimate that an aerobatic, quick-release door would cost an incremental $10,000 in engineering design per affected airplane model and an additional $500 per production airplane. Little or no additional weight is expected.

These costs would only apply in cases where the manufacturer determines that the marketplace return of a combination type certificate would outweigh the additional costs of design and production.

Section 23.841 Pressurized cabins. The proposed revision to § 23.841(a) would extend the cabin pressure requirements of current paragraph (a), which now apply to airplanes certificated for operation above 31,000 feet, to airplanes certificated for operation above 25,000 feet. Current FAR 25, JAR 25, and proposed JAR 23 include the same requirement proposed here. This proposed requirement is intended to protect airplane occupants from harm if a malfunction occurs at altitudes where symptoms of hypoxia occur.

For airplanes that will be certificated for maximum altitude operation between 25,000 feet and 31,000 feet, the proposal would necessitate two additional pressure altitude regulators and associated plumbing. Industry sources estimate that the proposed requirement would cost an incremental $1,000 in engineering design per affected airplane model and $2,000 per production airplane. Any additional weight would be negligible.

The benefits of the proposal would derive from the incremental protection against hypoxia afforded to occupants of airplanes certificated for maximum altitude between 25,000 and 31,000 feet. Due to the increasing use of turbine engines, more part 23 airplanes are likely to be approved for operation above 25,000 feet. In the absence

of this proposed rule, an increasing number of occupants would be exposed to the potential for harm in the event of a failure or malfunction of the pressure system on these airplanes.

Section 23.853 Passenger and crew compartment interiors. The proposed rule would revise the section heading from "Compartment interiors" to "Passenger and crew compartment interiors" for consistency with the introductory text of the section and to clarify the content of the section.

No costs are attributed to this provision.

Section 23.855 Cargo and baggage compartment fire protection. Proposed paragraph (a) would require all sources of heat within each cargo and baggage compartment that are capable of igniting the compartment contents to be shielded and insulated to prevent such ignition. Existing § 23.787(f) requires that cargo compartment lamps be installed so as to prevent contact between the lamp bulb and cargo. The proposal would clarify and extend this provision to include all sources of heat for baggage as well as cargo compartments.

Lights and (rarely) heaters for pets are typically the only sources of heat located in a baggage or cargo compartment. A wire cage, costing no more than $20, around the heat source would meet these requirements. The FAA estimates that the total cost of compliance per airplane would be no more than $40 in those rare cases where such protection would not

have been provided anyway. The benefit of the proposed provision is a reduction in the possibility of fire caused by the ignition of compartment contents by lights or heaters.

Proposed paragraph (b) would require cargo and baggage compartments to be constructed of materials that meet the appropriate provisions of § 23.853(d)(3). Currently these requirements apply to commuter category airplanes and to the materials used in the compartments of these airplanes. The proposed new requirement would expand this applicability to the cargo and baggage compartments of all part 23 airplanes. In effect, the proposed new requirement would require materials that are self-extinguishing rather than flame resistant as currently required under § 23.787(d).

Information provided by manufacturers shows that materials that meet self-extinguishing flame requirements are available at a slightly higher cost than materials that meet flame resistant requirements. The FAA conservatively estimates that the incremental costs of complying with proposed § 23.855(b) would be less than $200 per airplane. The safety benefits of this provision would be an increase in cargo and baggage compartment fire protection.

Proposed new paragraph (c) would add new fire protection requirements for cargo and baggage compartments for commuter category airplanes. The proposed rule would require one of the following three alternatives:

(1) The compartment must be located where pilots seated at their duty station would easily discover the fire or the compartment must be equipped with a smoke or fire detector system to warn the pilot's station. The compartment must also be accessible for fire extinguisher application.

(2) The compartment may be inaccessible, but must be equipped with a fire detector system that warns the pilot station, and the compartment must have ceiling and sidewall floor panels constructed of materials that have been subjected to and meet the vertical self-extinguishing tests of appendix F of part 23.

(3) The compartment must be constructed and sealed to contain any fire.

The FAA cannot predict the designs of cargo and baggage compartments for future airplanes. If manufacturers choose to use smoke detectors, however, no more than 2 smoke detectors would be required per airplane. An aerospace engineer could determine the most appropriate location and design the smoke detector system in approximately 30 hours at a burdened rate of $60 per hour, for a total cost of $1,800 per certification. Two detectors, including wiring and installation, are estimated to cost about $4,550.[2] Maintenance costs for the smoke detectors would cost

[2] Industry sources estimate that a fire detector would cost $2,000, or $4,000 for 2 detectors. Installation would cost $550 for 10 hours of a mechanic's time at a burdened rate of $55 per hour. The cost for 2 detectors, therefore, would be $4,550 ($4,000 + $550) per affected airplane.

approximately $100 per year. Materials that would meet the vertical self-extinguishing tests of appendix F (see option 2 in the discussion above) would result in incremental costs of less than $200 per airplane.

The FAA estimates that it would cost $500 to construct a sealed compartment, or a total of $1,000 for 2 compartments, if the manufacturer chooses that method of complying with the proposed requirement (see option 3 in the discussion above).

Irrespective of the individual compliance method, the benefits of the proposed provision would come from the increased likelihood that a cargo or baggage compartment fire would either be extinguished or contained.

Section 23.867 Electrical bonding and protection against lightning and static electricity. The proposed revision would change the heading that precedes the section from "Lightning evaluation" to "Electrical bonding and lightning protection." It would also revise the section heading from "Lightning protection of structures" to "Electrical bonding and protection against lightning and static electricity." The proposed revisions more accurately describe the content of the section.

No costs are attributed to this provision.

Section 23.1303 Flight and navigation instruments. The proposed rule would revise the introductory phrase of the section, would revise existing paragraphs (d) and (e)(2), and would add new paragraphs (f) and

(g).

The introductory phrase for the section would be revised to clarify that the instruments required by this section are the minimum required flight and navigation instruments. No costs are attributed to this provision.

Revised § 23.1303(d) would add the requirement for a free air temperature indicator for those airplanes whose performance must be based on weight, altitude, and temperature. This requirement already applies to turbine powered airplanes. The proposal would extend the requirement to reciprocating engine powered airplanes of more than 6,000 pounds. Industry sources estimate that the proposed requirement would cost an incremental $500 in engineering design per affected airplane model and $350 per production airplane. Any additional weight would be negligible. The potential benefits of the proposal would accrue from the requirement that the information necessary to determine the performance envelope of the airplane be available to the pilot.

A new sentence added to § 23.1303(e)(2) would state that nuisance overspeed warnings should not occur at lower speeds where pilots might ignore the warning. Manufacturers of overspeed warning devices set the tolerance (i.e., upper and lower) limits of these devices during the production process. The proposed rule merely specifies where the lower limit should be set. Therefore, no incremental costs are attributed to this provision.

To preclude potential cases of unwanted pitch adjustments of attitude instruments installed in small airplanes, § 23.1303(f) proposes to limit the adjustment range to the span that is needed for parallax correction. Attitude instruments that meet this requirement are currently available at no additional cost.

Proposed § 23.1303(g) would identify specific instruments, and limits of those instruments, required for commuter category airplanes. Proposed § 23.1303(g)(1) states that if airspeed limitations vary with altitude, the airspeed indicators must show the variation of the maximum operating limit speed (V_{MO}) with altitude. Industry sources indicate that an airspeed indicator with a V_{MO} "pointer" would cost $1,000 more than one without. Two airspeed indicators are required on commuter airplanes, therefore, the incremental cost of this requirement would be $2,000 per commuter category airplane produced. The potential safety benefit of the proposal would derive from the requirement that the information necessary to determine the maximum operating limit speed be available at all altitudes.

Proposed § 23.1303(g)(2) states that altimeters must be of a sensitive type. Since all altimeters used in modern airplanes are sensitive altimeters, no incremental costs are attributed to this provision.

Finally, proposed § 23.1303(g)(3) would require (for commuter category IFR-approved airplanes with passenger seating configurations of 10 or more) a third, independent, attitude indicator (AI). Industry sources

estimate that an aerospace engineer could design and document a third attitude instrument system in 100 hours at a burdened rate of $60 per hour, totalling $6,000 per certification. It is estimated that an AI would cost approximately $8,000, including a standby battery, and that the installation would cost $2,200 for 40 hours of a mechanic's time at a burdened rate of $55 per hour. However, proposed § 23.1311(a)(5), discussed below, would delete the requirement for a rate-of-turn indicator when an independent attitude indicator is installed.[3] The costs associated with a rate-of-turn indicator include: 40 hours of design and documentation costs, $1,000 per indicator, and 40 hours of installation. Therefore, the incremental cost for an IFR-approved airplane with a passenger seating capacity of 10 or more would be $3,600 for 60 hours of engineering (100 hours for the AI, minus 40 hours for the rate-of-turn indicator); $7,000 for the instrument ($8,000 for the AI, minus $1,000 for the rate-of-turn indicator); and no additional cost for the installation (40 hours for the AI, minus 40 hours for the rate-of-turn indicator).

The potential safety benefits of a third, independent attitude indicator would derive from the reduced potential for erroneous attitude information. Currently, two attitude instruments are required for a ten passenger, IFR approved commuter category airplane. Service experience has shown that a failure can occur whereby an attitude indicator can

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[3] Current requirements in § 91.205(d)(3)(i), § 135.159(a)(1), and § 121.305(f) also permit a third attitude indicator in lieu of a rate-of-turn indicator. This proposed requirement would mandate a third attitude indicator.

appear to be working when it is actually providing incorrect information. During such a failure, pilots may have difficulty determining which instrument to follow, and hazardous flight attitudes may result. A third attitude indicator would allow the crew to retain reliable attitude information even in cases where one instrument is not operating correctly.

Section 23.1307 Miscellaneous equipment. The proposed rule would move the requirement of § 23.1307(a) to § 23.785. The discussion of § 23.785 addresses this proposed change. Also, the provisions of § 23.1307(b)(1), (b)(2), and (b)(3) would be removed from § 23.1307. Having previously been added to §§ 23.1361, 23.1351, and 23.1357, respectively, these provisions are redundant. The designator for paragraph (c) would also be removed in conformance with the proposed removal of paragraphs (a) and (b).

No costs are attributed to the proposed amendment to this section.

Section 23.1309 Equipment, systems, and installations. Proposed new § 23.1309(a)(4) would correct an inadvertent omission that occurred when the FAA issued amendment 23-41 (55 FR 43306, October 26, 1990) to replace SFAR 41. The proposal would require that equipment, systems, and installations in commuter category airplanes be designed to safeguard against hazards to the airplane in the event of their malfunction or failure. The requirement existed prior to its inadvertent removal by amendment 23-41.

No costs are attributed to this technical correction.

Section 23.1311 Electronic display instrument systems. The proposed rule would revise § 23.1311 to remove redundant requirements and to clarify which secondary instruments are necessary and which visibility standards apply. Section 23.1311 was adopted by amendment 23-41 (55 FR 43306, October 26, 1990). Prior to adoption, several nonsubstantive changes were made to remove the redundancy included in the notice. In the process, certain provisions, such as the one that permitted the installation of mechanical secondary instruments, were inadvertently omitted from the final rule. In addition, interim discussions with airplane manufacturer representatives have shown that the requirements that define where secondary instruments may be installed are unclear. Accordingly, the FAA is proposing to revise this section to correct and clarify these provisions.

Current § 23.1311(a), which requires electronic display indicator installations that are independent to each pilot station, would be deleted because it is redundant to § 23.1321(a). Section 23.1321(a) already requires that each flight, navigation, and powerplant instrument for use by any required pilot shall be located so that any pilot seated at the controls can monitor the instruments with minimum head and eye movement.

In place of current paragraph (a), proposed § 23.1311(a) would be a revision of current paragraph (c). The proposed paragraph would clarify

which instruments are required and the visibility standards for those instruments. Proposed new § 23.1311(a)(1) would require electronic display instrument installations to meet the arrangement and visibility requirements of § 23.1321(a). Proposed § 23.1311(a)(2), (3), and (4) would be redesignated with no changes from current (c)(1), (2), and (3).

Proposed § 23.1311(a)(5) would continue the requirement of § 23.1303(c) for a magnetic direction indicator. In addition, it would require either: (1) an independent secondary mechanical altimeter, airspeed indicator, and attitude indicator; or (2) individual electronic display indicators for the altimeter, airspeed, and attitude that are independent from the airplane's primary electrical power. The substance of proposed (a)(5) is a combination of and change to current § 23.1311(b), which states that certain electronic display indicators must be independent of the airplane's electrical power system, and current § 23.1311(c)(4) which requires an independent secondary attitude indicator and a rate-of-turn instrument and specifies the location of those instruments. Proposed § 23.1311(a)(5) would delete the existing requirement for a rate-of-turn instrument. The information that would be provided by a secondary rate-of-turn instrument would not appreciably add to the safe operations of the airplane if a pilot has the information provided by the secondary attitude instrument.

Current § 23.1311(c)(5) and (6) would be redesignated as (a)(6) and (7) without change. Proposed new § 23.1311(b) and (c) would continue the requirements of current § 23.1311(d) and (e) without change.

No costs are attributed to any of the proposed changes to this section. The provisions are either clarifying, editorial or relieving.

Section 23.1321 Arrangement and visibility. The proposed revision to § 23.1321 would remove the wording that limits the instrument location requirement of § 23.1321(d) to airplanes certificated for flight under instrument flight rules or airplanes weighing more than 6,000 pounds. Instruments should be located near the pilot's vertical plane of vision, without regard to the approved flight rules or the maximum weight of the airplane.

The provision would add a new standard for the arrangement of instruments on airplanes not certificated for flight under instrument flight rules and weighing 6,000 pounds or less. The FAA holds that no incremental costs would be incurred to meet this requirement.

Section 23.1323 Airspeed indicating system. The proposed new § 23.1323(c) would add a requirement that airspeed system design should provide positive drainage of moisture from the system. This proposal parallels the drainage requirements of existing § 23.1325(b) for any static system.

No costs are attributed to the provisions of proposed paragraph (c).

Existing paragraph (c), pertaining to commuter airplanes, would be redesignated as paragraph (e), and the words "in flight and" would be

removed from the first sentence. Paragraph (b) of this section already requires that airspeed indicating systems for all part 23 airplanes be calibrated in flight.

No costs are attributed to the provisions of proposed paragraph (e).

Proposed new § 23.1323(g) would state that, on those commuter airplanes where duplicate airspeed systems are required, the airspeed pitot tubes must be located far enough apart so that a single bird strike will not damage both tubes.

The FAA holds that no incremental costs would be incurred to meet this requirement.

Section 23.1325 Static pressure system. Existing § 23.1325(b)(3) prescribes certain static pressure system requirements for airplanes that encounter icy conditions. Existing paragraph (g) exempts from those requirements any airplanes that are prohibited from flight in instrument meteorological conditions in accordance with § 23.1559(b). After the adoption of § 23.1325(g), the FAA noted that there are additional conditions, other than instrument meteorological conditions, where icing may be encountered. Accordingly, the FAA proposes to also exempt from the provisions of § 23.1325(b)(3) airplanes that are prohibited from flight in icing conditions.

No costs are attributed to this provision since it would be cost

relieving for affected airplane models.

Section 23.1326 Pitot heat indication system. Proposed new § 23.1326 would require the installation of a pitot tube heat indicating system on those airplanes required to be equipped with a heated pitot tube. Heated pitot tubes ensure that moisture will not freeze in the tube and block or partially block the airspeed system.

A pitot heat indicating system, including an in-line current sensor, panel light, and associated wiring, would cost approximately $500. According to industry sources, an aerospace engineer could design and document such a system in 20 hours at a burdened rate of $60 per hour, totalling $1,200. A mechanic could install the system in 20 hours at a burdened rate of $55 per hour, totalling $1,100. The estimated non-recurring cost per certification, therefore, would total $2,800 ($1,200 for design, $500 for the certification airplane's indicator, and $1,100 for installation of that indicator). The estimated cost per production airplane would be $1,600 ($500 for the system and $1,100 for installation).

The National Transportation Safety Board (NTSB) investigated a series of single model accidents that occurred between May 1989 and March 1991. During that period, five fatal accidents and a near fatal incident occurred in the United States. Two additional fatal accidents involving the same airplane model occurred in foreign countries. The NTSB's analysis indicated that four of the five U.S. accidents probably

involved ice blockage of the pitot tubes because the pilots failed to activate pitot heat before flying into freezing instrument meteorological conditions. The Board recommended (A-92-86) that the FAA consider requiring a pitot heat operating light on small airplanes certificated to operate in icing conditions.

A pitot heat indicating system would advise the pilots of any inoperative heating element in the pitot tube and the subsequent inaccuracies that could result. The proposed provision would reduce the likelihood that pilots would rely on inaccurate airspeed information resulting from a blocked or partially blocked pitot tube.

Section 23.1329 Automatic pilot system. Recently adopted § 23.1329(b) (58 FR 18958, April 9, 1993) does not state clearly that stick controlled airplanes must be equipped with the same autopilot quick release controls that are required for airplanes with control wheels. The proposed revision to this paragraph would clarify that a quick release control must be installed on each control stick of an airplane that can be operated from either pilot seat.

No costs are attributed to this provision since it would clarify an existing requirement.

Section 23.1337 Powerplant instruments installation. The proposed rule would revise the heading of this section to better describe its contents and to differentiate it from § 23.1305.

In addition, § 23.1337(b) would be revised by removing the requirement that fuel indicators be marked in gallons and pounds. In countries that use the metric system, other acceptable units of measure for marking fuel indicators are used. The proposed revision would facilitate harmonization by allowing the use of any appropriate measurement unit.

No costs are attributed to the revised heading or to the relaxed requirement for fuel indicator units.

Proposed new § 23.1337(b)(4) would require a "means to indicate" the amount of usable fuel in each tank when the airplane is on the ground. This requirement would ensure that a reliable means is provided for the pilot to determine before takeoff that the amount of fuel that is in the airplane is adequate for the intended flight. The proposal, which is patterned after the oil quantity indicator requirements of § 23.1337(d) and (d)(1), would not require a separate fuel indicating system. The means to determine the amount of fuel while on the ground may be provided by a calibrated dipstick, separate markings on the inflight fuel indicator, or any other acceptable means selected by the manufacturer. Accordingly, this proposal would contribute to the safe operation of the airplane and would not appreciably add to the cost of the airplane design. Any associated compliance costs would be negligible.

Section 23.1351 General. Proposed § 23.1351 would be revised by removing portions of paragraphs (b)(2) and (b)(3) and by removing all of

paragraph (b)(4). The subject language addresses alternators that depend on the battery for initial excitation or stabilization. This revision responds to a recommendation to remove provisions that would allow a battery failure to result in the loss of the alternator. The FAA has verified that self-excited alternators are now standard equipment; therefore, there is no longer a need for the regulations to address alternators that depend on a battery for initial excitation and stabilization. No incremental costs are ascribed to this change.

Proposed § 23.1351(c)(3) would revise the requirement for an automatic means of reverse current protection. The proposed revised wording would more accurately define both the function and the equipment that would accomplish the protection.

No costs are attributed to the proposed clarification of paragraph (c)(3).

Finally § 23.1351(f) would be revised to require that the ground power receptacle be located where its use would not result in a hazard to the airplane or to people on the ground using the receptacle.

No costs are attributed to the revision of paragraph (f).

Section 23.1353 Storage battery design and installation. Proposed new § 23.1353(h) would require that, in the event of a complete loss of the primary electrical power generating system, airplane battery capacity

must be sufficient to supply at least 30 minutes of electrical power to those loads essential to the continued safe flight and landing of the airplane.

In some cases, manufacturers may need to install larger batteries with greater capacities to comply with the proposed requirements. The FAA estimates that the size and capacity of a larger battery would add no more than a few pounds (incremental operating costs of less than $10 per year) and $20 to $30 of additional cost for the battery.

On some airplanes, a "load shedding" procedure, where the pilot would sequentially turn off certain equipment, could be required either in place of or in addition to a larger battery. The procedure would be provided in the pilot's operating handbook (POH). The FAA estimates that an aerospace engineer could establish a load shedding procedure in 10 hours at a burdened rate of $60 per hour, for a total cost of $600 per affected certification.

Irrespective of the method of compliance, the proposal would increase the likelihood that sufficient electrical power would be available to safely land the airplane in the event of an electrical generating system failure.

Section 23.1359 Electrical system fire protection. Proposed new § 23.1359 would require smoke and fire protection for electrical systems. Proposed § 23.1359(a) states that electrical systems must meet

the applicable requirements of §§ 23.863 (Flammable fluid fire protection) and 23.1182 (Nacelle areas behind firewalls). This provision does not add new requirements, but merely repeats the need for fire protection for electrical systems. No costs are associated with this provision.

Proposed § 23.1359(b) would require that electrical system components be fire resistant if they are installed in designated fire zones and are used during emergency procedures. This provision is needed to clarify the requirements for electrical system components that are installed in designated fire zones. The FAA has determined that the incremental costs of this provision would be negligible.

Finally, § 23.1359(c) provides burn criteria for electrical wire and cables. A proposed revision to appendix F to part 23 would add appropriate wire testing criteria. Demonstrating and documenting that electrical wires and cables meet the requirements of this provision would take an aerospace engineer approximately 4 hours at a burdened rate of $60 per hour, for a total of $240 per certification. The requirement and testing criteria would increase the likelihood that necessary wires and cables would continue to function in the event of a fire.

Section 23.1361 Master switch arrangement. Existing paragraph (c) requires that, "The master switch or its controls must be so installed that the switch is easily discernible and accessible to a crewmember in

flight." To harmonize with the JAR, the proposal would revise § 23.1361(c) by making an editorial change to remove the words "in flight."

No costs are attributed to this revision.

Section 23.1365 Electrical cables and equipment. The proposed rule would revise existing § 23.1365(b) and would add three new paragraphs. Section 23.1365(b) would be revised in conformance with proposed § 23.1359(c) which would require self-extinguishing insulated electrical wires and cables. Current § 23.1365(b) requires that cable and associated equipment that might overheat in the event of circuit overload or fault must be flame resistant and may not emit dangerous quantities of toxic fumes. The proposed revisions to § 23.1365(b) would delete the reference to cables from the requirement since the cables would be required to have self-extinguishing insulation under § 23.1359(c).

No costs are associated with this conforming amendment.

Proposed § 23.1365(d) would add a requirement for the identification of electrical cables, terminals, and connectors. Different colored wires and/or tags could be used in conjunction with a wiring diagram to identify the cables, terminals, and connectors. The FAA estimates that a draftsman could design and document this identification system in 80 hours at a burdened rate of $55 per hour, a total of $4,400 per

certification. Incremental installation costs would be approximately $100 per airplane.

The increasing use of electrical systems in part 23 airplanes has added to the difficulty of wiring installation. The proposed requirement for cable identification would increase the likelihood that cables would be correctly installed initially and would be correctly reinstalled as part of later maintenance or modification.

Proposed § 23.1365(e) would require that electrical cables be installed to minimize damage by external sources. This reflects current sound engineering practices. No costs are associated with this proposed requirement.

Proposed § 23.1365(f) would require that a cable that cannot be protected by a circuit protection device or other overload protection must not cause a fire hazard under fault conditions. This could be achieved by using larger cables, where necessary. Industry sources indicate that any incremental costs would be negligible.

Section 23.1383 Taxi and landing lights. The landing light requirements of § 23.1383 would be revised by adding taxi lights. When landing light requirements were initially instituted, the same lights were used for landing and taxiing. Separate lights are now frequently used. Including the word "taxi" in the heading would clarify that the

requirements cover both types of lights. No incremental costs are attributed.

Current § 23.1383(a), which requires that the lights be acceptable, would be deleted because it is unnecessary to state this. All lights that are found to meet the pertinent airworthiness requirements are acceptable.

Current § 23.1383(b)(3) requires that a landing light must be installed to provide enough light for a night landing. Proposed § 23.1383(c) would revise "night landing" to "night operation" since the requirements would also cover taxiing and parking. Proposed new paragraph (d) would require that the lights be installed so that they do not cause a fire hazard.

No costs are attributed to these provisions.

Section 23.1401 Anticollision light system. The proposal would revise § 23.1401 to require the installation of an anticollision light system on all part 23 airplanes. Current § 23.1401 requires an anticollision light system only if certification for night operations is requested. Many manufacturers currently install anticollision light systems on all airplanes they produce.

Industry sources estimate that an aerospace engineer could design and document an anticollision light system in 40 hours at a burdened rate of

$60 per hour, for a total of $2,400 per affected certification. The system would cost $500 and would take a mechanic approximately 20 hours to install at a burdened rate of $55 per hour, a total of $1,600 per affected airplane ($500 + (20 hours x $55 per hour) = $1,600). The weight penalty would be negligible. Only those future models that would not otherwise have anticollision light systems would actually incur incremental costs as a result of this provision.

The number of airplanes that have been added to the small airplane fleet and the increasing speeds resulting from improved technology, especially turbine engines, warrant the use of anticollision lights for day operations as well as night. The reported midair collisions for 1984 through 1990 contain 269 reports of midair collisions in which 108 fatalities occurred. When the data were filtered (to account for night operations, IFR conditions, and aircraft not affected by this proposal) 104 midair accidents or incidents were found that occurred in daytime, VFR conditions. The reports do not reveal whether the airplanes were using anticollision lights at the time of the accident.

The FAA holds that requiring the installation of anticollision lights on all newly certificated airplanes, and requiring their operation during day operations (as proposed by revised § 91.209 and discussed later in this evaluation), would reduce the number of daylight, midair accidents. Even if the proposed requirement were only 25 percent effective, the 6-year accident history indicates that approximately 21 fatalities could be avoided during a similar 6-year period.

Section 23.1431 Electronic equipment. This proposal would add three new paragraphs to § 23.1431. Proposed new paragraph (c) would require that airplanes required to be operated by more than one flightcrew member must be evaluated to determine if the flightcrew members can converse without difficulty when they are seated at their duty stations. If the required evaluation shows that the noise level does not impair conversation, no further action would be required. If the evaluation shows that conversation would be difficult, however, an intercommunication system would be required.

The FAA estimates that an evaluation of cockpit noise could be conducted in conjunction with other certification testing, therefore, no incremental costs are associated with the evaluation. An aerospace engineer could design an intercom system in 20 hours at a burdened rate of $60 per hour, for a total of $1,200 per affected certification. The FAA estimates that the addition of an intercom system would cost approximately $500 per airplane. A mechanic could install the system in approximately 20 hours at a burdened rate or $55 per hour. The total incremental production cost for an affected airplane, therefore, would be $1,600 ($500 + (20 hours x $55 per hour)).

Proposed new paragraph (d) would require that if the communication equipment that is installed includes any means of switching from the receive mode to the transmit mode, the equipment must use "off-on" transmitter switching that turns the transmitter off when it is not being used. The cost of this feature is included in the $500 cost of

the intercom, described above.

Proposed new paragraph (e) would require that if communications headsets are provided, the applicant must demonstrate that flightcrew members can hear aural warnings, such as overspeed warnings and stall warnings, when headsets are being used. The evaluation of the ability of crewmembers to hear the aural warnings could be conducted in conjunction with other testing, necessitating no incremental cost for the evaluation. If the evaluation shows that aural warnings cannot be heard while crewmembers are wearing headsets, the warning systems could be wired into the headset system at a negligible incremental cost.

NTSB investigations of at least two commuter accidents[4] determined that excessive cockpit noise levels probably adversely affected the ability of the flight crews to communicate. As a result, the Board recommended (A-86-113) that the FAA require the installation and use of crew interphone systems in the cockpit of airplanes operating under part 135. The benefit of the proposed requirement would derive from the increased likelihood that flightcrew members would be able to converse without difficulty and that miscommunication and its attendant safety hazards would be reduced.

Section 23.1435 Hydraulic systems. Since the close of the comments for Small Airplane Airworthiness Review Program Notice 3, the FAA has been

[4]Bar Harbor Airlines, Flight 1808, August 25, 1985, 8 fatalities; and Henson Airlines, Flight 1517, September 23, 1985, 14 fatalities.

involved in discussions about the installation of hydraulic accumulators that are permitted by § 23.1435(c). These discussions have shown that the wording of § 23.1435(c) may make it difficult to understand. This notice would further revise § 23.1435(c) to clarify under what circumstances a hydraulic accumulator and reservoir may be installed on the engine side of any firewall.

No incremental costs are associated with this proposed provision since it would clarify an existing requirement.

Section 23.1447 Equipment standards for oxygen dispensing units.

Proposed new § 23.1447(a)(4) would require that if radio equipment is installed in an airplane, flightcrew oxygen dispensing units must be designed to allow use of the communication equipment when oxygen is being used.

Industry sources estimate that an oxygen mask with an integral microphone costs $1,000 more than an oxygen mask without a microphone. The costs per affected airplane, therefore, would be $2,000 for two masks. The benefit of the proposed requirement is that it would allow flightcrew communication under all operating conditions, including operations when oxygen is required.

Existing paragraphs (d) and (e) of § 23.1447 would also be revised to specify slightly different requirements regarding the availability of oxygen dispensing units. For pressurized airplanes designed to operate

at altitudes above 25,000 feet MSL, the dispensing units for passengers would continue to be required to be immediately available. By comparison to being "immediately available," the dispensing units for crewmembers would be required to either be automatically presented or be the "quick-donning" type. For airplanes certificated to operate above 30,000 feet, the dispensing units for passengers would continue to be required to be automatically presented.

No incremental costs are attributed to the proposed revisions in paragraphs (d) and (e).

Section 23.1451 Fire protection for oxygen equipment. This proposed new section would specify the fire protection requirements for oxygen equipment installations. Proposed paragraph (a) would prohibit the installation of oxygen equipment in designated fire zones. Paragraph (b) would specify the protection that must be provided for oxygen system components if oxygen equipment is installed in an area adjacent to a designated fire zone.

Proposed § 23.1451(c) would require oxygen equipment and lines either to be separated from other equipment or to be protected in a manner that would prevent escaping oxygen from striking grease, fluids, or vapors. The impingement of pure oxygen on certain materials can lower their combustion point to a value where ignition will occur in ambient conditions, thereby creating a potential source for an airplane fire.

Manufacturers could comply with this new requirement by routing lines and locating equipment away from designated fire zones. No incremental costs are attributed to the proposed provisions in this section.

Section 23.1453 Protection of oxygen equipment from rupture. This proposed new section would clarify the rupture protection needed for oxygen system installation. Rupture protection for oxygen systems is currently required by the application of the structures load requirements of part 23. The addition of § 23.1453(a) would clarify the application of these load requirements and would identify the need to consider maximum temperatures and pressures that may be present. Section 23.1453(b) would identify the protection to be provided for high pressure oxygen sources and the high pressure lines that connect these sources to the oxygen system shutoff valves.

Industry sources estimate that an aerospace engineer could analyze and document the loads on each element of the oxygen system in 16 hours at a burdened rate of $60 per hour, for a total cost of $960. The routing of oxygen pressure sources and lines to protect them from unsafe temperatures and crash landings would be part of an airplane's basic design and would not impose incremental costs.

Section 23.1461 Equipment containing high energy rotors. The proposal would revise paragraph (a) to clarify that the requirements apply to high energy rotors included in an auxiliary power unit (APU). Following the addition of this section to part 23, the FAA issued a policy

statement clarifying that § 23.1461 was adopted to cover equipment such as APU's and constant speed drives that may be installed on small airplanes. The proposed revision of paragraph (a) will clarify the applicability of this section as identified in that policy material.

No incremental costs are attributed to this provision.

Appendix F. The proposed rule would revise appendix F to provide the procedures needed to test electrical wire to ensure that the wire meets the burn requirements of § 23.1359. It would also add procedures for meeting the 45 degree and 60 degree angle burn test requirement proposed for §§ 23.855(c)(2) and 23.1359(c), respectively.

No costs are attributed to these revisions, aside from those discussed earlier.

Section 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements. Proposed new § 91.205(b)(11) would require that airplanes certificated under proposed § 23.1401 be equipped with an anticollision light system for day VFR operations. Day VFR operations are discussed under § 23.1401 of this notice.

No additional costs are attributed to this provision, since it reflects the proposed requirements of § 23.1401.

Section 91.209 Aircraft lights. Proposed new § 91.209(b) would require airplanes equipped with an anticollision light system to operate those lights during all operations, including daytime VFR.

The incremental cost of this provision would be incurred for light bulb replacement. The FAA estimates that a light bulb for an anticollision light system costs approximately $50 and that this provision would necessitate an incremental bulb replacement every two years. Accordingly, the cost is projected to equal $25 per year, per affected operating airplane.

IV. Outline Summary of Costs and Benefits

The following table lists the sections that would be affected by the proposed rule and the projected cost and benefit of each. It should be noted that the various cost impacts are not additive since the individual provisions would often apply to different segments of the airplanes included under part 23. The FAA holds that each of the provisions, as well as the entire proposal, would be cost beneficial.

Section	INCREMENTAL COST	BENEFIT
Section 23.75 Landing.	None.	Administrative.
Section 23.677 Trim systems.	Negligible.	Safety.
Section 23.691 Artificial stall barrier system.	None.	Administrative.

SECTION	INCREMENTAL COST	BENEFITS
Section 23.697 Wing flap controls.	$480 per certification and $100 per airplane for affected airplanes.	Nominal safety and relief.
Section 23.701 Flap interconnection.	None.	Clarification.
Section 23.703 Takeoff warning system.	$240 per certification for evaluation. Where necessary, $5,120 per certification, $1,000 per airplane and $100 per year.	Nominal safety and relief.
Section 23.723 Shock absorption tests.	None.	Editorial.
Section 23.729 Landing gear extension and retraction system.	¶ (e). None.	Clarification.
	¶ (g). Negligible, general practice.	Minor; general practice.
Section 23.735 Brakes.	¶ (a). None.	Editorial clarification.
	¶ (c). None.	Administrative.
	¶ (e). $240 per certification.	Minor safety.
Section 23.745 Nose/Tail wheel steering.	None.	Minor. Avoids special conditions.
Section 23.775 Windshields and windows.	¶ (a). None.	Relieving.
	¶ (c). None.	Clarification.
	¶ (h). Up to $350,000 per certification.	Safety.
Section 23.783 Doors.	¶ (b). None.	Minor safety.

SECTION	INCREMENTAL COST	BENEFITS
	¶ (f). $25 per airplane.	Safety.
Section 23.785 Seats, births, litters, safety belts and shoulder harnesses.	None.	Editorial organization.
Section 23.787 Baggage and cargo compartments.	¶ (a). $1 per airplane.	Minor safety.
	¶ (b). $60 per certification and up to $100 per airplane.	Safety.
	¶ (c). None.	Clarification.
Section 23.791 Passenger information signs.	$60 per certification, up to $200 per airplane, and a negligible effect on operating costs.	Safety.
Section 23.807 Emergency exits.	¶ (a)(4). Expected negligible.	Minor safety.
	¶ (b) and (b)(5). None.	Clarification and editorial.
	¶ (b)(6). Where chosen, $10,000 per certification and $500 per airplane.	Safety.
Section 23.841 Pressurized cabins.	$1,000 per certification and $2,000 per airplane.	Safety.
Section 23.853 Passenger and crew compartment interiors.	None.	Editorial.
Section 23.855 Cargo and baggage compartment fire protection.	¶ (a). Less than $40 per airplane.	Minor safety.
	¶ (b). Less than $200 per airplane.	Safety.

SECTION	INCREMENTAL COST	BENEFITS
	¶ (c). Potentially as high as $1,800 per certification, $4,550 per airplane, and $100 per year.	Safety.
Section 23.867 Electrical bonding and protection against lightning and static electricity.	None.	Editorial.
Section 23.1303 Flight and navigation instruments.	Introduction. None.	Clarification.
	¶ (d). $500 per certification and $350 per airplane.	Safety.
	¶ (e)(2). None.	Minor safety.
	¶ (f). None.	Minor safety.
	¶ (g)(1). Up to $2,000 per airplane.	Safety.
	¶ (g)(2). None.	Minor safety.
	¶ (g)(3). Up to $3,600 per certification and $7,000 per airplane.	Safety.
Section 23.1307 Miscellaneous equipment.	None.	Editorial and conforming.
Section 23.1309 Equipment, systems, and installations.	None.	Minor safety.
Section 23.1311 Electronic display instrument systems.	None.	Clarifying, editorial, and relieving.
Section 23.1321 Arrangement and visibility.	None.	Minor safety.

SECTION	INCREMENTAL COST	BENEFITS
Section 23.1323 Airspeed indicating system.	None.	Minor safety.
Section 23.1325 Static pressure system.	None.	Relieving.
Section 23.1326 Pitot heat indication system.	$2,800 per certification, $1,600 per airplane.	Safety.
Section 23.1329 Automatic pilot system.	None.	Clarifying.
Section 23.1337 Powerplant instruments installation.	Heading and ¶(b). None.	Clarifying, relieving.
	¶ (b)(4). Negligible.	Safety.
Section 23.1351 General.	¶ (b). None.	Administrative.
	¶ (c)(3). None.	Clarifying.
	¶ (f). None.	Minor safety.
Section 23.1353 Storage battery design and installation.	Where necessary, up to $30 per five years capital, up to $10 per year operating, and $600 per certification.	Safety.
Section 23.1359 Electrical system fire protection.	¶ (a). None.	Clarifying emphasis.
	¶ (b). Negligible.	Clarifying.
	¶ (c). $240 per certification.	Safety.
Section 23.1361 Master switch arrangement.	None.	Editorial.
Section 23.1365 Electrical cables and equipment.	¶ (b). None.	Conforming editorial.

SECTION	INCREMENTAL COST	BENEFITS
	¶ (d). $4,400 per certification and $100 per airplane.	Safety.
	¶ (e). None.	Minor safety.
	¶ (f). Negligible.	Minor safety.
Section 23.1383 Taxi and landing lights.	None.	Editorial update.
Section 23.1401 Anticollision light system.	Where necessary, $2,400 per certification and $1,600 per airplane.	Safety.
Section 23.1431 Electronic equipment.	¶ (c). Where necessary, up to $1,200 per certification and $1,600 per airplane.	Safety.
	¶ (d). Negligible. Included above.	Minor safety.
	¶ (e). None or negligible.	Safety.
Section 23.1435 Hydraulic systems.	None.	Clarifying.
Section 23.1447 Equipment standards for oxygen dispensing units.	¶ (a)(4). Up to $2,000 per airplane.	Safety.
	¶'s (d) and (e). None.	Minor safety.
Section 23.1451 Fire protection for oxygen equipment.	None.	Safety.
Section 23.1453 Protection of oxygen equipment from rupture.	$960 per certification.	Safety.
Section 23.1461 Equipment containing high energy rotors.	None.	Clarifying.

SECTION	INCREMENTAL COST	BENEFITS
Appendix F to Part 23 -- Test Procedure.	None. Considered above.	Minor safety.
Section 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.	None.	Safety, considered above.
Section 91.209 Aircraft lights.	$25 per year per airplane.	Safety, considered above.

V. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed rule would have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, establishes threshold cost values and small entity size standards for complying with RFA review requirements in FAA rulemaking actions. The proposed amendments would not have a significant economic impact on a substantial number of small entities.

VI. Trade Impact Assessment

The proposed rule would not constitute a barrier to international trade, including the export of American goods and services to foreign countries and the import of foreign goods and services into the United States. Instead, the proposed systems airworthiness standards have been harmonized with foreign aviation authorities and would lessen the restraints on trade.

Regulatory Evaluation Summary

For Insertion Into the Preamble

Regulatory Evaluation, Regulatory Flexibility Determination, and Trade Impact Assessment

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these analyses, the FAA has determined that this rule: (1) would generate benefits that would justify its costs and is not a "significant regulatory action" as defined in the Executive Order; (2) is not "significant" as defined in DOT's Policies and Procedures; (3) would not have a significant impact on a substantial number of small entities; and (4) would not constitute a barrier to international trade. These analyses, available in the docket, are summarized below.

Regulatory Evaluation Summary

This section summarizes the costs and benefits of each provision of the proposed rule. Many of the provisions would impose either no cost or a

negligible cost. Such provisions are typically administrative, editorial, clarifying, relieving, or conforming in nature. In addition, the FAA holds that certain provisions have a potential safety benefit that can be achieved with no incremental cost, due primarily to the fact that this rule would apply to future certificated airplanes and retrofitting would not be required. All provisions of the proposed rule, including those with no or negligible costs, are summarized below. Only those provisions with non-negligible costs are further evaluated in the section that follows. The reader is directed to the full regulatory evaluation for additional information.

Section	INCREMENTAL COST	BENEFIT
Section 23.75 Landing.	None.	Administrative.
Section 23.677 Trim systems.	Negligible.	Safety.
Section 23.691 Artificial stall barrier system.	None.	Administrative.
Section 23.697 Wing flap controls.	$480 per certification and $100 per airplane for affected airplanes.	Nominal safety and relief.
Section 23.701 Flap interconnection.	None.	Clarification.
Section 23.703 Takeoff warning system.	$240 per certification for evaluation. Where necessary, $5,120 per certification, $1,000 per airplane and $100 per year.	Nominal safety and relief.
Section 23.723 Shock absorption tests.	None.	Editorial.

SECTION	INCREMENTAL COST	BENEFITS
Section 23.729 Landing gear extension and retraction system.	¶ (e). None.	Clarification.
	¶ (g). Negligible, general practice.	Minor; general practice.
Section 23.735 Brakes.	¶ (a). None.	Editorial clarification.
	¶ (c). None.	Administrative.
	¶ (e). $240 per certification.	Minor safety.
Section 23.745 Nose/Tail wheel steering.	None.	Minor. Avoids special conditions.
Section 23.775 Windshields and windows.	¶ (a). None.	Relieving.
	¶ (c). None.	Clarification.
	¶ (h). Up to $350,000 per certification.	Safety.
Section 23.783 Doors.	¶ (b). None.	Minor safety.
	¶ (f). $25 per airplane.	Safety.
Section 23.785 Seats, births, litters, safety belts and shoulder harnesses.	None.	Editorial organization.
Section 23.787 Baggage and cargo compartments.	¶ (a). $1 per airplane.	Minor safety.
	¶ (b). $60 per certification and up to $100 per airplane.	Safety.

SECTION	INCREMENTAL COST	BENEFITS
	¶ (c). None.	Clarification.
Section 23.791 Passenger information signs.	$60 per certification, up to $200 per airplane, and a negligible effect on operating costs.	Safety.
Section 23.807 Emergency exits.	¶ (a)(4). Expected negligible.	Minor safety.
	¶ (b) and (b)(5). None.	Clarification and editorial.
	¶ (b)(6). Where chosen, $10,000 per certification and $500 per airplane.	Safety.
Section 23.841 Pressurized cabins.	$1,000 per certification and $2,000 per airplane.	Safety.
Section 23.853 Passenger and crew compartment interiors.	None.	Editorial.
Section 23.855 Cargo and baggage compartment fire protection.	¶ (a). Less than $40 per airplane.	Minor safety.
	¶ (b). Less than $200 per airplane.	Safety.
	¶ (c). Potentially as high as $1,800 per certification, $4,550 per airplane, and $100 per year.	Safety.
Section 23.867 Electrical bonding and protection against lightning and static electricity.	None.	Editorial.
Section 23.1303 Flight and navigation instruments.	Introduction. None.	Clarification.

SECTION	INCREMENTAL COST	BENEFITS
	¶ (d). $500 per certification and $350 per airplane.	Safety.
	¶ (e)(2). None.	Minor safety.
	¶ (f). None.	Minor safety.
	¶ (g)(1). Up to $2,000 per airplane.	Safety.
	¶ (g)(2). None.	Minor safety.
	¶ (g)(3). Up to $3,600 per certification and $7,000 per airplane.	Safety.
Section 23.1307 Miscellaneous equipment.	None.	Editorial and conforming.
Section 23.1309 Equipment, systems, and installations.	None.	Minor safety.
Section 23.1311 Electronic display instrument systems.	None.	Clarifying, editorial, and relieving.
Section 23.1321 Arrangement and visibility.	None.	Minor safety.
Section 23.1323 Airspeed indicating system.	None.	Minor safety.
Section 23.1325 Static pressure system.	None.	Relieving.
Section 23.1326 Pitot heat indication system.	$2,800 per certification, $1,600 per airplane.	Safety.
Section 23.1329 Automatic pilot system.	None.	Clarifying.

SECTION	INCREMENTAL COST	BENEFITS
Section 23.1337 Powerplant instruments installation.	Heading and ¶(b). None.	Clarifying, relieving.
	¶ (b)(4). Negligible.	Safety.
Section 23.1351 General.	¶ (b). None.	Administrative.
	¶ (c)(3). None.	Clarifying.
	¶ (f). None.	Minor safety.
Section 23.1353 Storage battery design and installation.	Where necessary, up to $30 per five years capital, up to $10 per year operating, and $600 per certification.	Safety.
Section 23.1359 Electrical system fire protection.	¶ (a). None.	Clarifying emphasis.
	¶ (b). Negligible.	Clarifying.
	¶ (c). $240 per certification.	Safety.
Section 23.1361 Master switch arrangement.	None.	Editorial.
Section 23.1365 Electrical cables and equipment.	¶ (b). None.	Conforming editorial.
	¶ (d). $4,400 per certification and $100 per airplane.	Safety.
	¶ (e). None.	Minor safety.
	¶ (f). Negligible.	Minor safety.
Section 23.1383 Taxi and landing lights.	None.	Editorial update.

SECTION	INCREMENTAL COST	BENEFITS
Section 23.1401 Anticollision light system.	Where necessary, $2,400 per certification and $1,600 per airplane.	Safety.
Section 23.1431 Electronic equipment.	¶ (c). Where necessary, up to $1,200 per certification and $1,600 per airplane.	Safety.
	¶ (d). Negligible. Included above.	Minor safety.
	¶ (e). None or negligible.	Safety.
Section 23.1435 Hydraulic systems.	None.	Clarifying.
Section 23.1447 Equipment standards for oxygen dispensing units.	¶ (a)(4). Up to $2,000 per airplane.	Safety.
	¶'s (d) and (e). None.	Minor safety.
Section 23.1451 Fire protection for oxygen equipment.	None.	Safety.
Section 23.1453 Protection of oxygen equipment from rupture.	$960 per certification.	Safety.
Section 23.1461 Equipment containing high energy rotors.	None.	Clarifying.
Appendix F to Part 23 -- Test Procedure.	None. Considered above.	Minor safety.
Section 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.	None.	Safety, considered above.

SECTION	INCREMENTAL COST	BENEFITS
Section 91.209 Aircraft lights.	$25 per year per airplane.	Safety, considered above.

Evaluation of Provisions with Non-Negligible Projected Costs

This section describes and evaluates those provisions of the proposed rule that are expected to impose costs that are not negligible.

Section 23.697 Wing flap controls. Proposed new § 23.697(c) would provide safety standards for the wing flap control lever designs installed in airplanes that use wing flap settings other than fully retracted when showing compliance with § 23.145. The FAA estimates that an aerospace engineer could design the flap control lever to meet the proposed requirement in 8 hours at a burdened rate of $60 per hour, totalling $480 per certification. The control lever itself would impose an incremental cost, including installation, of approximately $100 per airplane.

The nominal benefits of this provision would derive from the increased safety afforded the pilot in positively selecting the proper flap setting to maintain longitudinal control. In fact, if a flap position other than fully retracted were needed to maintain longitudinal control: (1) that position would be necessary to prevent an unsafe condition, (2) the airplane would not be certificated under that design, and

(3) the airplane would have to be redesigned so that intermediate flap positions would not be needed for control. Proposed paragraph (c) would allow the identification of an intermediate flap position and the positive means of selecting that position. This alternative would rectify the unsafe condition without requiring the manufacturer to redesign the airplane.

Section 23.703 Takeoff warning system. This proposed new section would require a takeoff warning system on some commuter category airplanes. The requirement would be applicable if the flight evaluation shows that an unsafe takeoff condition would result if lift devices or longitudinal trim devices are set to any position outside the approved takeoff range. If the evaluation shows that no unsafe condition would result at any setting of these devices, a takeoff warning system would not be required. For those airplanes on which a warning system must be installed, the proposed rule would provide requirements for the installation of the system.

The FAA estimates that an evaluation to determine whether a takeoff warning system would be needed would cost $240 (4 hours of engineering at a burdened rate of $60 per hour). Where needed, the integration design of a warning system would cost $2,400 (40 hours at $60 per hour). In addition, an incremental 4 hours of flight testing at a cost of $2,720 ($500 per hour for two test pilots and $180 per hour for fuel) would be needed to demonstrate the system's performance. The FAA estimates that the system, including acquisition, wiring, micro

switches, and labor, would add approximately $1,000 to the cost of each airplane required to have one. Maintenance of such a system would cost approximately $100 per year. The FAA solicits comments from interested parties concerning the expected certifications that would require a takeoff warning system and the concomitant costs to acquire, install, and maintain them.

The nominal benefits of this proposal would derive from the increased safety provided by the takeoff warning system that would activate whenever lift or longitudinal trim devices are not set within their approved takeoff ranges. In fact, if an evaluation showed that positions of the lift or longitudinal trim devices could create an unsafe condition on takeoff, the manufacturer would be required, under existing regulations, to redesign the devices so that the unsafe positions could not be obtained. The proposed section would provide relief by allowing the applicant to install a warning system rather than redesigning the trim device(s).

Section 23.735 Brakes. Proposed new § 23.735(e), applicable to commuter category airplanes, would require establishing the minimum rejected takeoff brake kinetic energy capacity rating of each main wheel brake assembly. Based on the operating experience of airplanes used in passenger carrying operations, existing § 23.45 requires the determination of the accelerate-stop distance for commuter category airplanes. This proposed requirement is needed to ensure that the

brakes will perform safely under accelerate-stop conditions.

Under the proposed rule, manufacturers of commuter airplanes could determine the kinetic energy absorption requirements either through a conservative rational analysis of the sequence of events expected during a rejected takeoff or by using a formula presented in proposed new § 23.735(e)(2). It is projected that the necessary determination would cost $240 based on four hours of engineering at a burdened rate of $60 per hour. The potential benefits of the proposal would derive from the added safety that would be provided by establishing beforehand the minimum necessary kinetic energy capacity rating of each main wheel brake assembly under rejected-takeoff conditions.

Section 23.775 Windshields and windows. Introductory text and paragraph (h)(1) would be added to require that commuter category windshield panes that are directly in front of the pilots be able to withstand the impact of a two pound bird at maximum approach flap speed. By requiring full protection against the strike of a two-pound bird at approach speed, additional protection would also be provided if the airplane strikes a larger bird or strikes a bird at a higher speed.

Proposed § 23.775(h)(2) would further require the panels of the windshield to be so arranged that, if one is damaged, other panels would remain to provide visibility for continuous safe flight and landing.

The potential costs of proposed § 23.775(h) would vary depending on the

circumstances of the affected manufacturer. Industry sources estimate that the total nonrecurring cost per model would range from $250,000 to $350,000, consisting of: (1) up to $200,000 for a bird strike test article ("bird gun") if the manufacturer does not have one; and (2) up to $150,000 of time and materials costs for the actual testing.

A manufacturer that has a bird strike test article would not incur additional capital test costs. Most manufacturers would incur up to $150,000 in time and materials costs for the actual testing, but even these costs would be mitigated by the existing need of most manufacturers to perform such tests for export sales to JAA member countries.

Industry sources estimate that there would be no identifiable increment in design or tooling costs since the windshield would be an integral part of the initial design. Similarly, little or no recurring costs per airplane (incremental materials, installation, or weight) are projected since it is reasonable to assume that the pressure load, as compared to bird strike resistance, would be the controlling factor in the windshield design strength.

The benefit of the proposal rule is the incremental protection against bird strikes that would be afforded to commuter category airplanes. The FAA has reviewed International Civil Aviation Organization (ICAO) data on bird strikes that occurred on member-country airplanes of 19,000 pounds or less from 1981 through 1989. These data show that

approximately 550 strikes occurred and that one out of seven strikes hit the windshield. The data show that:

1. Almost 52 percent of the strikes occurred at altitudes of less than 100 feet, and 26.7 percent occurred between 101 and 1000 feet.

2. Eighty-five percent of the strikes occurred at airspeeds of 150 knots or less.

3. Where bird types were reported, 27.6 percent of the strikes involved small birds and 58.6 involved medium size birds (2 pounds or less).

4. Incidents where the airplane was damaged showed that 16.9 percent resulted from small bird strikes and 64 percent resulted from medium size bird strikes.

These data show that most bird strikes occur at takeoff and landing altitudes and airspeeds, and that birds weighing two pounds or less are struck most often. The standards of the proposed provision are based on these statistics. Few fatalities and injuries resulted from the bird strikes reported in the ICAO data. Similarly, a review of NTSB accident records between 1982 and 1992 revealed no U.S. accidents resulting from bird strikes to the windshields of commuter category airplanes. As a result, the FAA is not able to illustrate the justification of this provision on the basis of historical accidents. Instead, the standards are being proposed based on the expert recommendations of the ARAC. It

is also noted that this standard will be applied in JAA member countries and that U.S. manufacturers wishing to export to those countries would be required to meet the standard in any event.

Given that this provision cannot be quantitatively supported on the basis of past accidents alone, the FAA expressly requests public input and comments on its expected costs and potential benefits.

Section 23.783 Doors. Proposed new paragraph (f) would require that the locks on lavatory doors, if installed, be designed so that they would not trap occupants. Lavatory door locks used in transport category airplanes (see § 25.783) meet the requirements of this proposed rule. The FAA estimates that the incremental cost of this provision would be no more than $25 per lock. The proposal would reduce the likelihood that occupants would be trapped in a locked lavatory, both in emergency and non emergency situations.

Section 23.787 Baggage and cargo compartments. The proposed rule would extend to normal, utility, and acrobatic airplanes the existing commuter requirement to prevent baggage from hazardous shifting. The FAA estimates that an aerospace engineer would be required for 1 hour, at a burdened cost of $60 per hour, to analyze the subject loads that would need to be constrained. Tiedowns would cost approximately $50 per baggage compartment, or no more than $100 per airplane. These additional costs would only apply to normal, utility, or acrobatic airplanes since commuter category airplanes are already subject to the

requirement under the existing rule.

The potential benefits of the proposed provision include the reduced likelihood: (1) that baggage compartments would be overloaded, (2) that stowed baggage would shift dangerously, and (3) that essential co-located equipment or wiring would be damaged.

Section 23.791 Passenger information signs. This proposed new section would require at least one illuminated sign notifying all passengers when seat belts should be fastened. The requirement would only apply to airplanes where flightcrew members could not observe occupant seats or where the flightcrew compartment is separated from the passenger compartment. The signs would have to be legible to all seated passengers and be operable from a crewmember station.

The FAA estimates that an aerospace engineer could design the required sign(s) in 1 hour, at a burdened rate of $60 per hour. The sign would cost approximately $200 per airplane, including parts and installation costs. Maintenance costs for bulb replacement would be negligible. The weight penalty associated with the light system would also be minor (no more than 2 pounds).

The safety benefits of the proposed change would derive from the increased likelihood that passengers would know when their seat belts should be fastened.

Section 23.807 Emergency exits. Proposed new § 23.807(a)(4) would provide the same hazard protection for a person using an emergency exit as that provided by proposed § 23.783(b) for a person who uses a passenger door. Emergency exits could not be located with respect to a propeller disk or any other hazard in a manner that would endanger persons using that exit.

The FAA holds that no incremental cost would be incurred to meet the standards of the proposed provision for newly certificated airplanes. However, this notice specifically requests that interested parties submit comments on the potential costs and methods of compliance that manufacturers would choose to comply with this proposed requirement.

Proposed paragraph 23.807(b)(5) would editorially revise the current egress requirements for acrobatic airplanes. Section 23.807(b)(6) would establish similar egress standards for utility category airplanes that are certificated for spinning. Industry sources estimate that an aerobatic, quick-release door would cost an incremental $10,000 in engineering design per affected airplane model and an additional $500 per production airplane. Little or no additional weight is expected. These costs would only apply in cases where the manufacturer determines that the marketplace return of a combination type certificate would outweigh the additional costs of design and production.

Section 23.841 Pressurized cabins. The proposed revision to § 23.841(a) would extend the cabin pressure requirements of current

paragraph (a), which now apply to airplanes certificated for operation above 31,000 feet, to airplanes certificated for operation above 25,000 feet. Current FAR 25, JAR 25, and proposed JAR 23 include the same requirement proposed here. This proposed requirement is intended to protect airplane occupants from harm if a malfunction occurs at altitudes where symptoms of hypoxia occur, usually above 25,000 feet.

For airplanes that will be certificated for maximum altitude operation between 25,000 feet and 31,000 feet, the proposal would necessitate two additional pressure altitude regulators and associated plumbing. Industry sources estimate that the proposed requirement would cost an incremental $1,000 in engineering design per affected airplane model and $2,000 per production airplane. Any additional weight would be negligible.

The benefits of the proposal would derive from the incremental protection against hypoxia afforded to occupants of airplanes certificated for maximum altitude between 25,000 and 31,000 feet. Due to the increasing use of turbine engines, more part 23 airplanes are likely to be approved for operation above 25,000 feet. In the absence of this proposed rule, an increasing number of occupants would be exposed to the potential for harm in the event of a failure or malfunction of the pressure system on these airplanes.

Section 23.855 Cargo and baggage compartment fire protection.

Proposed paragraph (a) would require all sources of heat within each

cargo and baggage compartment that are capable of igniting the compartment contents to be shielded and insulated to prevent such ignition. Existing § 23.787(f) requires that cargo compartment lamps be installed so as to prevent contact between the lamp bulb and cargo. The proposal would clarify and extend this provision to include all sources of heat for baggage as well as cargo compartments.

Lights and (rarely) heaters for pets are typically the only sources of heat located in a baggage or cargo compartment. A wire cage, costing no more than $20, around the heat source would meet these requirements. The FAA estimates that the total cost of compliance per airplane would be no more than $40 in those rare cases where such protection would not have been provided anyway. The benefit of the proposed provision is a reduction in the possibility of fire caused by the ignition of compartment contents by lights or heaters.

Proposed paragraph (b) would require cargo and baggage compartments to be constructed of materials that meet the appropriate provisions of § 23.853(d)(3). Currently these requirements apply to commuter category airplanes and to the materials used in the compartments of these airplanes. The proposed new requirement would expand this applicability to the cargo and baggage compartments of all part 23 airplanes. In effect, the proposed new requirement would require materials that are self-extinguishing rather than flame resistant as currently required under § 23.787(d).

Information provided by manufacturers shows that materials that meet self-extinguishing flame requirements are available at a slightly higher cost than materials that meet flame resistant requirements. The FAA conservatively estimates that the incremental costs of complying with proposed § 23.855(b) would be less than $200 per airplane. The safety benefits of this provision would be an increase in cargo and baggage compartment fire protection.

Proposed new paragraph (c) would add new fire protection requirements for cargo and baggage compartments for commuter category airplanes. The proposed rule would require one of the following three alternatives:

(1) The compartment must be located where pilots seated at their duty station would easily discover the fire or the compartment must be equipped with a smoke or fire detector system to warn the pilot's station. The compartment must also be accessible for fire extinguisher application.

(2) The compartment may be inaccessible, but must be equipped with a fire detector system that warns the pilot station, and the compartment must have ceiling and sidewall floor panels constructed of materials that have been subjected to and meet the vertical self-extinguishing tests of appendix F to part 23.

(3) The compartment must be constructed and sealed to contain any fire.

The FAA cannot predict the designs of cargo and baggage compartments for future airplanes. If manufacturers choose to use smoke detectors, however, no more than 2 smoke detectors would be required per airplane. An aerospace engineer could determine the most appropriate location and design the smoke detector system in approximately 30 hours at a burdened rate of $60 per hour, for a total cost of $1,800 per certification. Two detectors, including wiring and installation, are estimated to cost about $4,550. Maintenance costs for the smoke detectors would cost approximately $100 per year. Materials that would meet the vertical self-extinguishing tests of appendix F (see option 2 in the discussion above) would result in incremental costs of less than $200 per airplane.

The FAA estimates that it would cost $500 to construct a sealed compartment, or a total of $1,000 for 2 compartments, if the manufacturer chooses that method of complying with the proposed requirement (see option 3 in the discussion above).

Irrespective of the individual compliance method, the benefits of the proposed provision would come from the increased likelihood that a cargo or baggage compartment fire would either be extinguished or contained.

Section 23.1303 Flight and navigation instruments. Revised § 23.1303(d) would add the requirement for a free air temperature indicator for those airplanes whose performance must be based on weight, altitude, and temperature. This requirement already applies to turbine powered airplanes. The proposal would extend the requirement to

reciprocating engine powered airplanes of more than 6,000 pounds. Industry sources estimate that the proposed requirement would cost an incremental $500 in engineering design per affected airplane model and $350 per production airplane. Any additional weight would be negligible. The potential benefits of the proposal would accrue from the requirement that the information necessary to determine the performance envelope of the airplane be available to the pilot.

Proposed § 23.1303(g) would identify specific instruments, and limits of those instruments, required for commuter category airplanes. Proposed § 23.1303(g)(1) states that if airspeed limitations vary with altitude, the airspeed indicators must show the variation of the maximum operating limit speed (V_{MO}) with altitude. Industry sources indicate that an airspeed indicator with a V_{MO} "pointer" would cost $1,000 more than one without. Two airspeed indicators are required on commuter airplanes, therefore, the incremental cost of this requirement would be $2,000 per commuter category airplane produced. The potential safety benefit of the proposal would derive from the requirement that the information necessary to determine the maximum operating limit speed be available at all altitudes.

Proposed § 23.1303(g)(3) would require (for commuter category IFR-approved airplanes with passenger seating configurations of 10 or more) a third, independent, attitude indicator (AI). Industry sources estimate that an aerospace engineer could design and document a third attitude instrument system in 100 hours at a burdened rate of $60 per

hour, totalling $6,000 per certification. It is estimated that an AI would cost approximately $8,000, including a standby battery, and that the installation would cost $2,200 for 40 hours of a mechanic's time at a burdened rate of $55 per hour. However, proposed § 23.1311(a)(5), discussed below, would delete the requirement for a rate-of-turn indicator when an independent attitude indicator is installed. The costs associated with a rate-of-turn indicator include: 40 hours of design and documentation costs, $1,000 per indicator, and 40 hours of installation. Therefore, the incremental cost for an IFR-approved airplane with a passenger seating capacity of 10 or more would be $3,600 for 60 hours of engineering (100 hours for the AI, minus 40 hours for the rate-of-turn indicator); $7,000 for the instrument ($8,000 for the AI, minus $1,000 for the rate-of-turn indicator); and no additional cost for the installation (40 hours for the AI, minus 40 hours for the rate-of-turn indicator).

The potential safety benefits of a third, independent attitude indicator would derive from the reduced potential for erroneous attitude information. Currently, two attitude instruments are required for a ten passenger, IFR approved commuter category airplane. Service experience has shown that a failure can occur whereby an attitude indicator can appear to be working when it is actually providing incorrect information. During such a failure, pilots may have difficulty determining which instrument to follow, and hazardous flight attitudes may result. A third attitude indicator would allow the crew to retain reliable attitude information even in cases where one instrument is not

operating correctly.

Section 23.1326 Pitot heat indication system. Proposed new § 23.1326 would require the installation of a pitot tube heat indicating system on those airplanes required to be equipped with a heated pitot tube. Heated pitot tubes ensure that moisture will not freeze in the tube and block or partially block the airspeed system.

A pitot heat indicating system, including an in-line current sensor, panel light, and associated wiring, would cost approximately $500. According to industry sources, an aerospace engineer could design and document such a system in 20 hours at a burdened rate of $60 per hour, totalling $1,200. A mechanic could install the system in 20 hours at a burdened rate of $55 per hour, totalling $1,100. The estimated non-recurring cost per certification, therefore, would total $2,800 ($1,200 for design, $500 for the certification airplane's indicator, and $1,100 for installation of that indicator). The estimated cost per production airplane would be $1,600 ($500 for the system and $1,100 for installation).

The National Transportation Safety Board (NTSB) investigated a series of single model accidents that occurred between May 1989 and March 1991. During that period, five fatal accidents and a near fatal incident occurred in the United States. Two additional fatal accidents involving the same airplane model occurred in foreign countries. The NTSB's analysis indicated that four of the five U.S. accidents probably

involved ice blockage of the pitot tubes because the pilots failed to activate pitot heat before flying into freezing instrument meteorological conditions. The Board recommended (A-92-86) that the FAA consider requiring a pitot heat operating light on small airplanes certificated to operate in icing conditions.

A pitot heat indicating system would advise the pilots of any inoperative heating element in the pitot tube and the subsequent inaccuracies that could result. The proposed provision would reduce the likelihood that pilots would rely on inaccurate airspeed information resulting from a blocked or partially blocked pitot tube.

Section 23.1353 Storage battery design and installation. Proposed new § 23.1353(h) would require that, in the event of a complete loss of the primary electrical power generating system, airplane battery capacity must be sufficient to supply at least 30 minutes of electrical power to those loads essential to the continued safe flight and landing of the airplane.

In some cases, manufacturers may need to install larger batteries with greater capacities to comply with the proposed requirements. The FAA estimates that the size and capacity of a larger battery would add no more than a few pounds (incremental operating costs of less than $10 per year) and $20 to $30 of additional cost for the battery.

On some airplanes, a "load shedding" procedure, where the pilot would

sequentially turn off certain equipment, could be required either in place of or in addition to a larger battery. The procedure would be provided in the pilot's operating handbook (POH). The FAA estimates that an aerospace engineer could establish a load shedding procedure in 10 hours at a burdened rate of $60 per hour, for a total cost of $600 per affected certification.

Irrespective of the method of compliance, the proposal would increase the likelihood that sufficient electrical power would be available to safely land the airplane in the event of an electrical generating system failure.

Section 23.1359 Electrical system fire protection. Proposed § 23.1359(c) would provide burn criteria for electrical wire and cables. A proposed revision to appendix F to part 23 would add appropriate wire testing criteria. Demonstrating and documenting that electrical wires and cables meet the requirements of this provision would take an aerospace engineer approximately 4 hours at a burdened rate of $60 per hour, for a total of $240 per certification. The requirement and testing criteria would increase the likelihood that necessary wires and cables would continue to function in the event of a fire.

Section 23.1365 Electrical cables and equipment. Proposed § 23.1365(d) would add a requirement for the identification of electrical cables, terminals, and connectors. Different colored wires and/or tags could be used in conjunction with a wiring diagram to identify the cables,

terminals, and connectors. The FAA estimates that a draftsman could design and document this identification system in 80 hours at a burdened rate of $55 per hour, a total of $4,400 per certification. Incremental installation costs would be approximately $100 per airplane.

The increasing use of electrical systems in part 23 airplanes has added to the difficulty of wiring installation. The proposed requirement for cable identification would increase the likelihood that cables would be correctly installed initially and would be correctly reinstalled as part of later maintenance or modification.

Section 23.1401 Anticollision light system. The proposal would revise § 23.1401 to require the installation of an anticollision light system on all part 23 airplanes. Current § 23.1401 requires an anticollision light system only if certification for night operations is requested. Many manufacturers currently install anticollision light systems on all airplanes they produce.

Industry sources estimate that an aerospace engineer could design and document an anticollision light system in 40 hours at a burdened rate of $60 per hour, for a total of $2,400 per affected certification. The system would cost $500 and would take a mechanic approximately 20 hours to install at a burdened rate of $55 per hour, a total of $1,600 per affected airplane ($500 + (20 hours x $55 per hour) = $1,600). The weight penalty would be negligible. Only those future models that would not otherwise have anticollision light systems would actually incur

incremental costs as a result of this provision.

The number of airplanes that have been added to the small airplane fleet and the increasing speeds resulting from improved technology, especially turbine engines, warrant the use of anticollision lights for day operations as well as night. The reported midair collisions for 1984 through 1990 contain 269 reports of midair collisions in which 108 fatalities occurred. When the data were filtered (to account for night operations, IFR conditions, and aircraft not affected by this proposal) 104 midair accidents or incidents were found that occurred in daytime, VFR conditions. The reports do not reveal whether the airplanes were using anticollision lights at the time of the accident.

The FAA holds that requiring the installation of anticollision lights on all newly certificated airplanes, and requiring their operation during day operations (as proposed by revised § 91.209 and discussed later in this evaluation), would reduce the number of daylight, midair accidents. Even if the proposed requirement were only 25 percent effective, the 6-year accident history indicates that approximately 21 fatalities could be avoided during a similar 6-year period.

Section 23.1431 Electronic equipment. This proposal would add three new paragraphs to § 23.1431. Proposed new paragraph (c) would require that airplanes required to be operated by more than one flightcrew member must be evaluated to determine if the flightcrew members can converse without difficulty when they are seated at their duty stations.

If the required evaluation shows that the noise level does not impair conversation, no further action would be required. If the evaluation shows that conversation would be difficult, however, an intercommunication system would be required.

The FAA estimates that an evaluation of cockpit noise could be conducted in conjunction with other certification testing, therefore, no incremental costs are associated with the evaluation. An aerospace engineer could design an intercom system in 20 hours at a burdened rate of $60 per hour, for a total of $1,200 per affected certification. The FAA estimates that the addition of an intercom system would cost approximately $500 per airplane. A mechanic could install the system in approximately 20 hours at a burdened rate or $55 per hour. The total incremental production cost for an affected airplane, therefore, would be $1,600 ($500 + (20 hours x $55 per hour)).

Proposed new paragraph (d) would require that if the communication equipment that is installed includes any means of switching from the receive mode to the transmit mode, the equipment must use "off-on" transmitter switching that turns the transmitter off when it is not being used. The cost of this feature is included in the $500 cost of the intercom, described above.

NTSB investigations of at least two commuter accidents determined that excessive cockpit noise levels probably adversely affected the ability of the flight crews to communicate (Bar Harbor Airlines, Flight 1808,

August 25, 1985, 8 fatalities; and Henson Airlines, Flight 1517, September 23, 1985, 14 fatalities.) As a result, the Board recommended (A-86-113) that the FAA require the installation and use of crew interphone systems in the cockpit of airplanes operating under part 135. The benefit of the proposed requirement would derive from the increased likelihood that flightcrew members would be able to converse without difficulty and that the safety hazard of miscommunication would be reduced.

Section 23.1447 Equipment standards for oxygen dispensing units. Proposed new § 23.1447(a)(4) would require that if radio equipment is installed in an airplane, flightcrew oxygen dispensing units must be designed to allow use of the communication equipment when oxygen is being used.

Industry sources estimate that an oxygen mask with an integral microphone costs $1,000 more than an oxygen mask without a microphone. The costs per affected airplane, therefore, would be $2,000 for two masks. The benefit of the proposed requirement is that it would allow flightcrew communication under all operating conditions, including operations when oxygen is required.

Section 23.1453 Protection of oxygen equipment from rupture. This proposed new section would clarify the rupture protection needed for oxygen system installation. Rupture protection for oxygen systems is currently required by the application of the structures load

requirements of part 23. The addition of § 23.1453(a) would clarify the application of these load requirements and would identify the need to consider maximum temperatures and pressures that may be present. Section 23.1453(b) would identify the protection to be provided for high pressure oxygen sources and the high pressure lines that connect these sources to the oxygen system shutoff valves.

Industry sources estimate that an aerospace engineer could analyze and document the loads on each element of the oxygen system in 16 hours at a burdened rate of $60 per hour, for a total cost of $960. The routing of oxygen pressure sources and lines to protect them from unsafe temperatures and crash landings would be part of an airplane's basic design and would not impose incremental costs.

Section 91.209 Aircraft lights. Proposed new § 91.209(b) would require airplanes equipped with an anticollision light system to operate those lights during all operations, including daytime VFR.

The incremental cost of this provision would be incurred for light bulb replacement. The FAA estimates that a light bulb for an anticollision light system costs approximately $50 and that this provision would necessitate an incremental bulb replacement every two years. Accordingly, the cost is projected to equal $25 per year, per affected operating airplane.

In summary, the FAA holds that the benefits of the proposed rule, though

not directly quantifiable, would exceed the expected costs. Each of the provisions, as well as the entire proposal, would be cost beneficial.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed rule would have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, establishes threshold cost values and small entity size standards for complying with RFA review requirements in FAA rulemaking actions. The proposed amendments would not have a significant economic impact on a substantial number of small entities.

Trade Impact Assessment

The proposed rule would not constitute a barrier to international trade, including the export of American goods and services to foreign countries and the import of foreign goods and services into the United States. Instead, the proposed systems airworthiness standards have been harmonized with those of foreign aviation authorities and would lessen the restraints on trade.

FAA ANALYSIS OF NON-ASTERISK ITEMS TO JAA LETTER OF 1/20/94

FLIGHT

23.45(b)(1) Airport altitude

HN changed. Now harmonized.

23.49(c)&(d) 61 Knot Stall

Known disharmony.

23.49(b) Unknown

FAR & JAR read exactly the same.

23.51(b)(1)(i) Landback vs. emergency landing

Known disharmony.

23.57(d) Demonstrated takeoff

Known disharmony.

23.57(e) Power or speed.

Known disharmony.

23.59(a)(2) Placement of phrase (b)(2)"with all engines operating".

Known disharmony.

23.59(b) Clearway

FAR words necessary for FAR operating rules.

23.67(a)(1) & (2) 61 kt stall

Known disharmony.

23.149(d) V_{sse}

Known disharmony.

23.155(c) Excessive decrease in stick force gradient.

HN changed. Now harmonized.

23.203(b) Wings level stall recovery.

Known disharmony.

23.1585(a)(4) Single-engine restart.

Known disharmony.

AIRFRAME

23.335(b)(4)(iii) Design airspeeds

1) JAR 23.335(b)(4)(iii) reads "...Mach 0.05." FAR 23.335(b)(4)(iii) reads "...Mach .05." The airframe NPRM is corrected to read "...Mach 0.05."

2) JAR 23.335(b)(4) reads "...greater of the following: (i)...; and (ii).... (iii)....
" FAR 23.335(b)(4) reads "...greater of the following: (i)...; (ii)...; or (iii)...."

23.341(c) Gust load factors

JAR presents the equation for gust load factors, n, derived for metric units.
FAR presents the equation for gust load factors, n, derived for U.S. units.
There is no technical disharmony. There are other accepted presentation differences like:

JAR	FAR
"sub-paragraph"	"paragraph"
"of this paragraph"	"of this section"
"JAR 23.341"	"§ 23.341"

23.499(e) Supplementary conditions for nose wheels

FAA deleted "...which is directly connected mechanically..." and replaced it with "...that has a mechanical connection..." FAA also deleted "...at least for..." and replaced it with "...to withstand..." JAA not accepting text.

23.571(b) Metallic pressurized cabin structures
23.572(c) Metallic wing, empennage and associated structures
23.573(c) Damage tolerance and fatigue evaluation of structure
FAR 23.574 Metallic damage tolerance and fatigue evaluation of commuter category airplanes

FAA deleted the "previously proposed" ***Inspection*** paragraphs from §§ 23.571(b) and 23.572(c). FAA now proposing a revised ***Inspection*** requirement as new § 23.575. JAA awaiting the final rule. Indication is JAA may propose NPA action.

23.629(i) Flutter

In paragraph (i), FAA substituted "...that..." for "...which...", moved "...alone..." to another location in the sentence, deleted "...which is...", and both deleted and inserted punctuation. JAA not accepting text.

FAA deleted "...by these tests..." in paragraph (b). JAA seem unaware of this change.

23.673 Primary flight controls

FAA deleting rule for two-control airplanes. Preamble contains an explanation.

Systems

23.775(f) Windshields and windows

FAA added punctuation, three comma's, in paragraph (e). FAA added parentheses and an apostrophe in paragraph (h)(1). JAR and SHN 23.775 harmonize (a) thru (e); (f) nearly harmonizes with (g); (g) harmonized with (h); FAA paragraph (f) will be moved to FAR 23.773 in a future harmonization notice. JAA plans to propose an NPA.

23.787 Baggage and cargo compartments

FAA changed "or" to "and" and "-" to ":" in paragraph (a). FAA deleted a comma in paragraph (a)(2). FAA changed "which" to "that" and added the words "...baggage or..." to paragraph (b). FAA proposed above changes for final rule.

23.791 Passenger information signs.

FAA Notice proposal for four airplane categories. JAA limited to commuter category. JAA expected to review FAA final rule for NPA.

23.855 Cargo and baggage compartment fire protection.

FAA notice proposes materials for four airplane categories meet improved burn requirements of 23.853(d)(3). JAR requires improved burn requirements for commuter and flame resistant for other three categories. JAA proposes NPA after FAA final rule.

23.1311 Electronic display instrument systems.

Text of FAA proposal revised for clarification. JAR and FAR requirements are same. JAA agrees with clarification and proposes an NPA.

23.1331 Instruments using a power source.

FAR revision resulting from amendment 23-43 being consider by JAA specialist group.

23.1351 General

The last sentence of FAA proposal rewritten for clarity. JAA expected to consider NPA after FAA final rule.

23.1365 Electrical cables and equipment.

Paragraph (e) of the JAR was adopted as paragraph (c) for FAR by amendment 23-43. Resulting difference in paragraph designation being considered by JAA.

23.1401 Anticollision light system.

Current FAR notice proposal would make FAR exactly the same as JAR.

KEN/TANK 9:30

FAA ANALYSIS OF ASTERISKED ITEMS ATTACHED TO JAA LETTER OF 1/20/94

FLIGHT

23.155(b)
23.177(a) **Design and Operating Maneuvering Speed (V_A/V_O)**
23.1507
23.1563(a)
23.1583(a)(2)

Amendment 23-45 replaced V_A with V_O for all operational speed applications. JAA action is pending.

23.177(a) **Wings level sideslip.**

HN changed. Now harmonized.

23.1529 **Instructions for Continued Airworthiness**

Known disharmony. The FAA text reflects U.S. industry practice.

23.1583(b), (c) and (p) **Introductory Words**

23.1583(b) "The following information must be furnished"
23.1583(c) "The Airplane Flight Manual must include"
23.1583(p) "must be provided".

HN changed. Now harmonized.

23.1585(c)(3) **Best Single-Engine-Out Climb Speed (V_{SSE})**

V_{SSE}. Known disharmony.

AIRFRAME

23.341(a) **Gust load factors**

FAA changed "for" to "to withstand." JAA NPA action planned.

23.343(c) **Design fuel loads**

Known disharmony. JAA awaiting publication of JAR-OPS.

23.345(d) **High lift devices**

FAA changed "for" to "to withstand," and deleted the word "speed." JAA NPA action planned.

23.369(a) **Rear lift truss**

FAA changed "for" to "to withstand." JAA not adopting "withstand." [Presentation, not technical, disharmony?]

23.371(a) **Gyroscopic and aerodynamic loads**

FAA changed "inertia" to "inertial" and added a comma. JAA NPA action planned.

23.371(b) **Gyroscopic and aerodynamic loads**

FAA rewrote the paragraph for "clarity." JAA observes presentation difference. JAA not accepting text.

23.393 **Loads parallel to the hinge line**

FAA changed "for inertia" to "to withstand inertial" in paragraph (a), and changed "inertia" to "inertial" in paragraph (b). JAA NPA action planned.

23.441(b) **Maneuvering loads**

FAA rewrote paragraph (b) for "clarity." JAA observes presentation difference. JAA not accepting text.

23.473(c)(1) **Ground load conditions and assumptions**

JAR contains "...JAR 23.67; and". FAR cites sub-paragraphs as follows, "...§ 23.67(b)(1) or (c); and". Preamble explains FAA reasons. JAA not accepting text.

23.562(b), (c)(5), &(d) **Emergency landing dynamic conditions**

The airframe harmonization proposal does not propose changes to § 23.562. JAA comment most likely addresses the FAA "61-knot rule" (amendment 23-44) and the "commuter seat proposal" (NPRM 93-71). Additional FAA/JAA "work" necessary.

23.607(a) **Fasteners**

FAA changed "an additional" to "a." ["An additional" locking feature cannot be added where one does not exist. "A" locking feature can be added.] JAA not accepting text.

23.607(b) Fasteners

FAA removed "...such as temperature and vibration." Preamble contains an explanation. JAA NPA action planned.

23.611 Accessibility provisions

FAA rewrote the paragraph for clarity. JAA not accepting text.

23.785(c) Seats, berths, litters, safety belts and shoulder harnesses

The airframe harmonization proposal does not propose changes to § 23.785(c). JAA comment addresses the "commuter seat proposal" (NPRM 93-71). Additional FAA/JAA "work" necessary.

23.865 Fire protection of flight controls, engine mounts and other flight structures

FAA substituted "...in designated fire zones, or in adjacent areas that would be subjected to the effects of fire in the designated fire zones,..." for "...in the engine compartment...." JAA NPA action planned.

POWERPLANTS

23.903(a)(1) Engines and APU's

Known disharmony

23.903(d)(1) Engines and APU's

Known disharmony

23.903(e)(1)&(3) Engines and APU's

Confusing because Harmonization Notice does not address these paragraphs

23.925 Propeller clearance

Known disharmony

23.933 Reversing systems

"Clean-up " Harmonization Notice will provide harmony

23.934 Turbojet and turbofan reverser system tests

Known disharmony

23.961 Fuel system hot weather operation

To be resolved at future Specialist meeting

23.973(c) Fuel tank filler connection

Correction made to Harmonization Notice; now harmonized

23.975(a)(5) Fuel tank vents and carburetor vapor vents

Known disharmony

23.979(b)(2) Fuel valves and controls

Technically harmonized

23.995(f) Fuel valves and controls

Confusing because Harmonization Notice does not address this paragraph

23.993(e) Fuel system lines and fittings

"Clean-up" Harmonization Notice will provide harmony

23.1011(a) Oil system, general

Known disharmony

23.1043(a)(2) Cooling tests

Technically harmonized

23.1045(a) Cooling test procedures for turbine engine powered airplanes

Technically harmonized

23.1047(a) Cooling test procedures for reciprocating engine powered airplanes

Technically harmonized

23.1143(g) Engine controls

"Clean-up" harmonization Notice will provide harmony

23.1147(b) Mixture controls

"Clean-up" Harmonization Notice will provide harmony

23.1143(f) Engine controls

Technically harmonized

23.1189(a)(5) Shut-off means

Known disharmony

23.1193(b) Cowling and nacelle

Known disharmony

23.1203(a)(1) Fire detector system

Known disharmony

SYSTEMS

23.1305 Powerplant instruments

Not a harmonization item. JAA considering Amendments 23-43. Additional FAA/JAA "work" necessary.

23.1307 Miscellaneous equipment

Like JAR, FAA harmonization notice proposing to delete paragraphs (a) and (b). Would retain contents of paragraph (c). JAA awaiting publication of JAR-OPS and has not accepted paragraph (c).

23.1323(f) Airspeed indicating system

The Systems Harmonization NPRM must be adopted before the Flight Harmonization NPRM because:

1. The Systems notice redesignates FAR 23.1323(d) as FAR 23.1323(f), and

2. The Flight notice deletes FAR 23.1323(f) [because airspeed system calibration information is contained in FAR 23.1587].

Then, after both the Systems and Flight Harmonization NPRMs become Amendments, the JAR/FAR correlation will be as follows:

JAR 23.1323	FAR 23.1323 (after SHN & FHN)
a	a
b	b
c	c [SHN added]
d (not req'd)	d
e (JAR-OPS)	e
f	f [deleted by FHN]
g	g {SHN added]

Technical harmony; format different. JAA plans to review FAA final rule.

23.1326 Pitot heat indicating systems

FAR applies to any category airplane, JAR only to commuter. FAR 23, like FAR 25, requires amber light indicator (NTSB requirement) JAR does not ("black cockpit"). JAA awaiting final rule.

23.1361(a) Master switch arrangement

There is no Systems Harmonization NPRM proposal for paragraph (a). JAR 23.1361(a) is different from FAR 23.1361(a) (Amdt 23-43).
JAR NPA action planned?

14 CFR Parts 23 and 91

[Docket No. 27806; Amendment No. 23–49, 91–247]

RIN 2120–AE59

Airworthiness Standards; Systems and Equipment Rules Based on European Joint Aviation Requirements

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This final rule amends the systems and equipment airworthiness standards for normal, utility, acrobatic, and commuter category airplanes. This amendment completes a portion of the Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA) effort to harmonize the Federal Aviation Regulations and the Joint Aviation Requirements (JAR) for airplanes certified in these categories. This amendment will provide nearly uniform systems and equipment standards for airplanes certificated in the United States under 14 CFR part 23 and in JAA countries under Joint Aviation Requirements 23, simplifying international airworthiness approval.

EFFECTIVE DATE: March 11, 1996.

FOR FURTHER INFORMATION CONTACT: Earsa Tankesley, Aerospace Engineer, Standards Office (ACE–100), Small Airplane Directorate, Federal Aviation Administration, 601 East 12th Street, Kansas City, Missouri 64106, telephone (816) 426–6932.

SUPPLEMENTARY INFORMATION:

Background

This amendment is based on Notice of Proposed Rulemaking (NPRM) No. 94–21 (59 FR 37620, July 22, 1994). All comments received in response to Notice 94–21 have been considered in adopting this amendment.

This amendment completes part of an effort to harmonize the requirements of part 23 and JAR 23. The revisions to part 23 in this amendment pertain to systems and equipment airworthiness standards. Three other final rules are being issued in this **Federal Register** that pertain to airworthiness standards for flight, powerplant, and airframe. These related rulemakings are also part of the harmonization effort. Interested persons should review all four final rules to ensure that all revisions to part 23 are recognized.

The harmonization effort was initiated at a meeting in June 1990 of the JAA Council (consisting of JAA members from European countries) and the FAA, during which the FAA Administrator committed the FAA to support the harmonization of the U.S. regulations with the JAR that were being developed. In response to the commitment, the FAA Small Airplane Directorate established an FAA Harmonization Task Force to work with the JAR 23 Study Group to harmonize part 23 with the proposed JAR 23. The General Aviation Manufacturers Association (GAMA) also established a JAR 23/part 23 committee to provide technical assistance.

The FAA, JAA, GAMA, and the Association Europeenne des Constructeurs de Material Aerospatial (AECMA), an organization of European airframe manufacturers, met on several occasions in a continuing harmonization effort.

Near the end of the effort to harmonize the normal, utility, and acrobatic category airplane airworthiness standards, the JAA requested and received recommendations from its member countries on proposed airworthiness standards for commuter category airplanes. Subsequent JAA and FAA meetings on this issue resulted in proposals that were reflected in Notice 94–21 to revise portions of the part 23

commuter category airworthiness standards. Accordingly, this final rule adopts the systems and equipment airworthiness standards for all part 23 airplanes.

In January 1991, the FAA established the Aviation Rulemaking Advisory Committee (ARAC) (56 FR 2190, January 22, 1991). At an FAA/JAA Harmonization Conference in Canada in June 1992, the FAA announced that it would consolidate the harmonization effort within the ARAC structure. The FAA assigned to ARAC the rulemakings related to JAR/part 23 harmonization, which ARAC assigned to the JAR/FAR 23 Harmonization Working Group. The proposals for systems and equipment airworthiness standards contained in Notice 94–21 were a result of both the working group's efforts and the efforts at harmonization that occurred before the formation of the working group.

The JAA submitted comments to the FAA on January 20, 1994, in response to the four draft proposals for harmonization of the part 23 airworthiness standards. The JAA submitted comments again during the comment period of the NPRM. At the April 26, 1995, ARAC JAR/FAR 23 Harmonization Working Group meeting, the JAA noted that many of the comments in the January 20 letter had been satisfied or were no longer relevant. The few remaining items concern issues that are considered beyond the scope of this rulemaking and, therefore, will be dealt with at future FAA/JAA Harmonization meetings.

Discussion of Comments

General

Interested persons were invited to participate in the development of these final rules by submitting written data, views, or arguments to the regulatory docket on or before November 21, 1994. Six commenters responded to Notice 94–21. Two of these commenters, the Civil Aviation Authority (CAA) and the Joint Aviation Authorities (JAA), submitted comments that were identical; therefore, the responses to both commenters are the same. Minor technical and editorial changes have been made to the proposed rules based on relevant comments received and after further review by the FAA.

One general comment was received from Transport Canada. It expressed concurrence with the notice. The comment also noted that the proposals (the comment did not identify the specific sections) are applicable to JAR Very Light Aircraft (VLA) standards for night operations and that it will consider adding these proposals to the Canadian standards for VLA approved for night and Instrument Flight Rule (IFR) operations. It suggests that the FAA may wish to consider this as well.

Discussion of Comments to Specific Sections of Parts 23 and 91

Section 23.677 Trim Systems

Proposed § 23.677(a) would clarify the need to mark the lateral and directional trim indicators with the neutral trim position. Since trim indicators on most airplanes are currently marked with the neutral position of the trimming device, this proposal would standardize the cockpit markings for all airplanes.

Revised paragraph (a) would also add a requirement for the pitch trim indicator to be marked with the proper pitch trim range for the takeoff of the airplane. Some takeoff accidents, including some involving fatalities, have occurred because the pitch trim was not set to the proper range needed for the airplane takeoff.

No comments were received on the proposals for this section. On reviewing the published notice, the FAA discovered the phrase "center or gravity" should have read "center of gravity."

The proposals are adopted with the above correction.

Section 23.691 Artificial Stall Barrier System

The requirements of § 23.201(c) provide criteria for the in-flight demonstration of wings level stall. The requirements also specify the means of identifying when a stall has occurred. Amendment No. 23–45 (58 FR 42136, August 6, 1993) revised § 23.201(c) by adding the activation of an artificial stall barrier as an acceptable means of identifying when a stall has occurred. Proposed new § 23.691 would provide standards for artificial stall barrier systems if such a system is used to show compliance with § 23.201(c).

Two comments were received on this proposal in which the JAA and the CAA note that the proposal has not been fully discussed by JAA specialists and recommend that the proposal be withdrawn. The JAA also provides a list of 12 issues to be considered if the FAA proceeds with the adoption of the proposal.

The FAA has reviewed the handling of this proposal from the time that it was identified in the original 1990 FAA comments on an early draft of JAR 23. This item was first presented to the JAA specialists for review in 1991 and since that time it has been thoroughly coordinated with the JAA. The JAA's current JAR 23 Notice of Proposed Amendment list contains an item for the inclusion of 23.691 in JAR 23, based on the text in a draft of this final rule. The FAA understands that the JAA expects to adopt the item following the finalization of this rule. Under these circumstances, the FAA does not find it necessary to defer adoption for further consideration.

Moreover, the FAA has reviewed each of the 12 issues that the JAA provided for FAA's consideration, and prepared a response which has been included in the Rules Docket. Since the issues are beyond the scope of the proposal, the FAA has not included them in this final rule publication.

In the course of the FAA's review, however, the FAA noted that the word "necessary" in the introductory paragraph of § 23.691 should be changed to "used," to make it clear that the equipment requirements of this section are applicable if a stick pusher system is used in the airplane to show compliance with § 23.201(c).

Section 23.691 is adopted with the above change.

Section 23.697 Wing Flap Controls

Proposed new § 23.697(c) would provide safety standards for the wing flap control levers installed in airplanes that use wing flap settings other than fully retracted when showing compliance with § 23.145.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.701 Flap Interconnection

Section 23.701 (a)(1) and (a)(2) would be revised to clarify the requirements for flap systems installed on part 23 airplanes.

No comments were received on the proposals for this section, and they are adopted as proposed.

Section 23.703 Takeoff Warning System

This proposed new section would require a takeoff warning system on some commuter category airplanes. The requirement would be applicable if the certification flight evaluation showed that an unsafe takeoff condition would result if lift devices or longitudinal trim devices are set to any position outside the approved takeoff range. If the evaluation shows that no unsafe condition would result at any setting of these devices, a takeoff warning system would not be required. For those airplanes on which a warning system must be installed, the proposal would provide requirements for the installation of the system.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.723 Shock Absorption Tests

To correct a grammatical error in the rules, paragraph (b) of this section would be revised by changing the word "reserved" in the phrase "reserved energy absorption capacity" to "reserve."

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.729 Landing Gear Extension and Retraction System

This proposal would revise § 23.729(e) to clarify that a landing gear indicator is required for each gear. This proposal would also add a new § 23.729(g) requiring that if the landing gear bay is used as the location for equipment other than landing gear, that equipment must be designed to minimize damage from items such as a tire burst, or rocks, water, and slush that may enter the landing gear bay.

One comment was received on this section, which suggested that the current requirements do not properly include a standard for amphibious operation. The comment specifically identified the warning horn or similar aural device as confusing and a source of pilot error during operations of an amphibian airplane. The commenter provided a suggestion for a landing gear position indicator on an amphibian airplane that would assist in clarifying this confusion.

Although this comment has merit, the proposed rule did not consider such a requirement, and no action has been taken to include the suggested landing gear position indicator for amphibian airplanes in this final rule. This comment will be retained and the suggestion for an amphibian landing gear indicator will be presented at a future harmonization meeting for specialist consideration and possible future inclusion in part 23/JAR 23.

Although not proposed in the notice, the text of paragraph (g) has been revised to identify sources of equipment damage that should be considered in the application of this requirement.

Section 23.729 is adopted with the above changes.

Section 23.735 Brakes

Section 23.735(a) would be revised to state clearly that wheel brakes must be provided. A proposed new § 23.735(c) would require the brake system to be designed so that the brake manufacturer's specified brake pressures are not exceeded during the landing distance determined in accordance with § 23.75. Proposed new § 23.735(e), applicable to commuter category airplanes, would require establishing the minimum rejected takeoff brake kinetic energy capacity rating of each main wheel brake assembly.

One comment was received on the proposal for § 23.735(e), which noted that the factor, "0.0443" is not defined for the kinetic energy formula. The commenter recommends that V be stated in units such as, feet-per-second (or mph, or knots, as required). The commenter notes that the recommended clarification should reduce possible future misunderstanding and confusion, as well as improper brake capacity calculations.

The FAA agrees. The units for "V" in the definition of the kinetic energy formula were inadvertently omitted from the proposal for this section. To correct this omission, the definition is being revised to read: "V=Ground speed, in knots, associated with the maximum value of V_1 selected in accordance with § 23.51(c)(1)."

The proposal is adopted with the above change.

Section 23.745 Nose/Tail Wheel Steering

Proposed new § 23.745 would provide requirements that apply if nose/tail wheel steering is installed.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.775 Windshields and Windows

Section 23.775(a) would be revised to allow internal glass panels of windshields and windows to be constructed of nonsplintering material, as well as nonsplintering glass. Section 23.775(c) would be revised to clarify that the requirement of this section applies to pressurized airplanes if certification for operation up to and including 25,000 feet is requested.

Section 23.775(h), introductory text, and paragraph (h)(1) would be added to require windshield panes of commuter category airplanes that are directly in front of the pilots to withstand the impact of a two-pound bird strike. This requirement is based on a Joint Aviation Authority recommendation to add windshield bird strike protection for commuter category airplanes.

No comments were received on the proposals for this section, and they are adopted as proposed.

Section 23.783 Doors

Proposed paragraph (b) would add a requirement that passenger doors must not be located near any propeller disk or any other potential hazard that could endanger persons using the door. The propeller disk remains the prominent hazard but other items, such as hot deicer surfaces or sharp objects on the airplane structure, are also hazards.

Proposed new paragraph (g) would require lavatory doors, if installed, that would not trap occupants inside a closed and locked lavatory compartment.

No comments were received on the changes proposed for this section, and they are adopted as proposed.

Section 23.785 Seats, Berths, Litters, Safety Belts, and Shoulder Harnesses

Seat requirements of part 23 would be clarified by moving the seat provisions from current § 23.1307(a), which requires a seat or berth for each occupant, to the introductory text of § 23.785. The notice proposed to reference the requirements of § 23.1413, for a metal-to-metal latching device for seat belts and shoulder harnesses, in § 23.785(b). These proposed changes were intended to combine related seat requirements in one section. The JAA and CAA comments note that the phrase "with metal-to-metal latching device" is also reflected in § 23.1413, but with different applicability.

The FAA agrees. The proposed changes to this section were made to clarify the seat requirements by including, or referencing, all of the seat requirements in one section. The notice proposal to add the phrase "with metal-to-metal latching devices as required by § 23.1413" to paragraph (b) would provide this clarification for normal, utility, or acrobatic category airplanes. However, because this paragraph is not applicable to all categories of airplanes, this change, along with the retention of § 23.1413 could be confusing.

To accomplish the originally intended clarification of the seat requirements, and to correct the applicability differences noted by the commenters, § 23.1413 is being removed and the phrase, "with metal-to-metal latching device" is being added to §§ 23.785(b) and 23.785(c). Also, to make § 23.785(c) clearer, it has been divided into two sentences.

Section 23.785 is amended by adopting the introductory text and the revision of paragraphs (b) and (c) as identified above.

Section 23.787 Baggage and Cargo Compartments

Section 23.787 would be revised by extending the present requirements for cargo compartments to baggage compartments. As proposed, future baggage compartments on all airplane categories would be required to: be placarded for their maximum weight capacity; have a means to prevent the baggage from shifting; and have a means to protect controls, wiring, lines, and equipment or accessories that are located in the compartment and whose damage or failure would affect safe operation of the airplane. This revision would result in the commuter category requirements of § 23.787(g) being redundant, and that requirement is being removed.

Proposed revisions to this section would also move the requirements of paragraphs (d) and (f) to a proposed new § 23.855, which would address cargo and baggage compartment fire protection. Proposed new paragraph (c) of this section would require flight crew emergency exits on airplanes that are used only for the carriage of cargo to meet the requirements of § 23.807.

No comments were received on the proposal for this section, and they are adopted as proposed.

Section 23.791 Passenger Information Signs

This proposed new section would require at least one illuminated sign to notify passengers when seat belts should be fastened on those airplanes in whit the flightcrew members cannot observe the other occupants' seats or where the flightcrew members' compartment is separated from the passenger compartment. One comment was received on this proposal, which noted the JAA's support of the proposal to require all airplanes, where the flightcrew members cannot observe the passenger seats, to be equipped with a "fasten seat belt" sign. The JAA also identified its intent to take NPA action to propose the same requirement.

Section 23.791 is adopted as proposed.

Section 23.807 Emergency Exits

Proposed new § 23.807(a)(4) would provide the same protection from any propeller disk and other potential hazard for a person who uses emergency exits as that provided by proposed § 23.783(b) for a person who uses a passenger door.

The proposed revision of § 23.807(b) would provide that the inside handles of emergency exits that open outward must be designed so that the emergency exit is protected against inadvertent operation.

The proposed revisions to § 23.807(b)(5) and new § 23.807(b)(6) would apply to acrobatic and utility category airplanes that are approved for maneuvers, such as spinning. The proposed rule would require that emergency exits for these category airplanes allow the occupants to abandon the airplane at certain speeds related to such maneuvers.

No comments were received on the proposals for this section, and they are adopted as proposed.

Section 23.841 Pressurized Cabins

The proposed revision to § 23.841(a) would extend the cabin pressure requirements of current paragraph (a), which now apply to airplanes certificated for operation above 31,000 feet, to airplanes certificated for operation over 25,000 feet.

No comments were received on this proposal, and it is adopted as proposed.

Section 23.853 Passenger and Crew Compartment Interiors

This proposal would revise the section heading from "Compartment interiors" to "Passenger and crew compartment interiors" to clarify the content of the section.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.855 Cargo and Baggage Compartment Fire Protection

This proposed new section would require the following:

Proposed paragraph (a) would require all sources of heat that are capable of igniting the contents of each cargo and baggage compartment to be shielded and insulated to prevent such ignition.

Proposed paragraph (b) would require cargo and baggage compartments to be constructed of materials that meet the appropriate provisions of § 23.853(d)(3). Currently these requirements apply to commuter category airplanes and to the materials used in the compartments of these airplanes. The proposed new requirement would expand this applicability to the cargo and baggage compartments of all part 23 airplanes. In effect, the proposed new requirement would require materials that are self-extinguishing rather than flame resistant as currently required under § 23.787(d).

Proposed new paragraph (c) would add new fire protection requirements for cargo and baggage compartments for commuter category airplanes. The proposed rule would require one of the following alternatives: (1) Either the compartment must be located where pilots seated at their duty station would easily discover the fire or the compartment must be equipped with a smoke or fire detector system to provide a warning at the pilot's station. Access to the compartment with a fire extinguisher must also be provided; (2) If the cargo or baggage compartment is inaccessible to the flightcrew, it must be equipped with a fire detector system that provides a warning at the pilot's station, and the compartment must have ceiling and sidewall floor panels constructed of materials that have been subjected to and meet the vertical self-extinguishing tests of appendix F of part 23; (3) The Compartment must be constructed and sealed to contain any fire.

Two comments were received on this proposal. The JAA and the CAA comment that proposed paragraph (b) would extend the self-extinguishing standards of § 23.853(d)(3) to the baggage and cargo compartments of all airplanes. JAR 23.855 requires this self-extinguishing standard for commuter category only. The commenters noted that the proposed applicability of this standard to all airplanes has not been agreed to for JAR 23.

There were no objections to the proposal or suggestions for changes, and § 23.855 is adopted as proposed.

Section 23.867 Electrical Bonding and Protection Against Lightning and Static Electricity

This proposed revision would change the heading that precedes § 23.867 from "Lightning Evaluation" to "Electrical Bonding and Lightning Protection." It would also revise the section heading from "Lightning protection of structures" to "Electrical bonding and protection against lightning and static electricity." The proposed revisions more accurately clarify the content of the section.

No comments were received on this proposal, and it is adopted as proposed.

Section 23.1303 Flight and Navigation Instruments

The introductory text of § 23.1303 would be revised to clarify that the section contains the minimum required instruments. Also, § 23.1303(d) would add a requirement for those airplanes whose performance must be based on weight, altitude, and temperature to be equipped with a free air temperature indicator. A new sentence added to § 23.1303(e)(2) would state that nuisance overspeed warnings should not occur at lower speeds where pilots might ignore the warning. A new paragraph (f) would propose requirements for attitude instruments

that include a means for flightcrew members to adjust the relative position of the attitude reference symbol and the horizon line. Finally, a new paragraph (g) would be added to identify certain specific instruments required for a commuter category airplane.

Two comments were received, which note that the additional instruments proposed for commuter category airplanes are not included in JAR 23. The JAA and the CAA also note that consideration of this proposal is being deferred by the JAA pending the publication of JAR-OPS and a review of the proposal by JAA specialists. (JAR-OPS are the JAR operations requirements issued by JAA.)

The requirement for §23.1303 is adopted as proposed.

Section 23.1307 Miscellaneous Equipment

This proposal would remove § 23.1307(a); these requirements are being added to § 23.785. The discussion of § 23.785 above addresses this change.

Also, the provisions of § 23.1307(b) are being removed from § 23.1307 as proposed. These requirements are stated in §§ 23.1361, 23.1351, and 23.1357, respectively, and are being removed to prevent confusion. The designation of paragraph (c) would be removed since it would no longer be necessary.

Two comments were received on this proposal. In these comments, the JAA and the CAA note that paragraph (c), adopted by Amendment 24–43, is pending a review by the JAA specialist for JAR 23.

The proposal is adopted as proposed.

Section 23.1309 Equipment, Systems, and Installation

Proposed new § 23.1309(a)(4) would correct an omission that occurred when the FAA issued Amendment No. 23–41 (55 FR 43306, October 26, 1990). To correct this oversight, and to continue the single fault provision of this paragraph, § 23.1309(a)(4) was proposed.

Two comments were received on this proposal. The JAA and the CAA note that, although the proposal for § 23.1309(a)(4) is not included in JAR 23, they support it, and will be considered for adoption in JAR 23.

Section 23.1309(a)(4) is adopted as proposed.

Section 23.1311 Electronic Display Instrument Systems

This proposal would revise § 23.1311 to remove redundant requirements and to clarify which secondary instruments are required and the visibility requirements for these instruments.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1321 Arrangement and Visibility

The proposed revision to § 23.1321(d) would remove the wording that limits the instrument location to airplanes certificated for flight under instrument flight rules or airplanes weighing more than 6,000 pounds. Instruments are for the pilot and should be located near that pilot's vertical plane of vision without regard to what flight rules are approved for the airplane's operation or the maximum weight of the airplane.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1323 Airspeed Indicating System

The proposed new § 23.1323(c) would add a requirement that each airspeed indicating system design and installation should provide positive drainage of moisture from the system.

To better organize the requirements that are applicable to the airspeed systems on all part 23 airplane categories and those that would be additional requirements for the airspeed systems of commuter category airplanes, the FAA proposed to redesignate existing paragraphs (c) and (e), respectively, as paragraphs (e) and (d). By this redesignation, paragraphs (a), (b), (c), and (d) would apply to all airplanes, and paragraphs (e) and (f) would include additional requirements applicable to commuter category airplanes.

The proposal for redesignated paragraph (e) would also remove the words "in flight and" from the first sentence of that paragraph. Proposed new § 23.1323(f) would provide that, on those commuter airplanes where duplicate airspeed indicators are required, the airspeed pitot tubes must be located far enough apart so that both tubes would not be damaged by a single bird strike.

No comments were received on the proposals for this section, and they are adopted as proposed.

Section 23.1325 Static Pressure System

Current § 23.1325(g) exempts from the requirements of § 23.1325(b)(3) airplanes that are prohibited from flight in instrument meteorological conditions in accordance with § 23.1559(b). The notice proposed to revise § 23.1325(g) by adding airplanes that are prohibited from flight in icing conditions to the airplanes that are currently exempted from the requirements of § 23.1325(b)(3).

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.1326 Pitot Heat Indication Systems

Proposed new § 23.1326 would require the installation of a pitot tube heat indicating system on those airplanes required to be equipped with a heated pitot tube.

The comments received from the JAA and the CAA show that this existing requirement in JAR 23 is applicable to commuter category airplanes only. They state that the FAA proposal would be applicable to all airplanes and would result in a continuous indication of pitot heat non-selection in every case. The JAA and the CAA do not support the applicability of this section to all airplanes.

The FAA does not agree that the proposal would be applicable to all airplanes. The proposal would apply only to these airplanes that are required, by § 23.1323(d), to be equipped with a heated pitot tube. By this applicability, airplanes that are approved for instrument flight, or for flight in icing conditions, would be required to be equipped with a heated pitot tube and a heated pitot tube indicator. These are the flight conditions where the pilot needs to be alerted if the pitot heat has not been turned on or if the heater fails. By this applicability, an airplane owner who has installed a heated pitot tube as optional equipment may continue to operate the airplane without a heated pitot tube indicator.

The preamble of the NPRM discusses the safety benefits that would be provided by this change.

The proposal is adopted as proposed.

Section 23.1329 Automatic Pilot System

Section 23.1329(b), as adopted by Amendment No. 23–24 (58 FR 18958, April 9, 1993), does not state clearly that stick controlled airplanes must be equipped with the same autopilot quick release controls that are required for airplanes with control wheels. The proposed revision of § 23.1329(b) would make it clear that a quick release control must be installed on each control stick of an airplane that can be operated from either pilot seat.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.1337 Powerplant Instruments Installation

This proposal would revise the heading of this section to accurately reflect the powerplant instrument

installation requirements that it contains. The difference between this section and § 23.1305 is clarified by this change.

Section 23.1337(b) would be revised by removing the wording that authorizes installation of only those fuel indicators marked in gallons and pounds. Section 23.1337(b) would also be revised by adding the word "usable" to the first sentence of this section. Proposed new § 23.1337(b)(4) would require a "means to indicate" the amount of usable fuel in each tank when the airplane is on the ground.

No comments were received on the proposals for this section, and they are adopted as proposed.

Section 23.1351 General

The proposal would revise current § 23.1351 by removing portions of paragraphs (b)(2) and (b)(3) and by removing paragraph (b)(4). The requirements proposed for removal are applicable to alternators that depend upon the battery for initial excitation or for stabilization.

Revised § 23.1351(c)(3) would require an automatic means for reverse current protection.

Section 23.1351(f) would be revised by adding a provision that would require the ground power receptacle to be located where its use will not result in a hazard to the airplane or to people on the ground using the receptacle.

No comments were received on the proposals. The proposals are adopted as proposed, except that paragraph (c)(3) has been revised to clarify that protection for any generator/alternator and the airplane electrical system must be provided.

Section 23.1353 Storage Battery Design and Installation

Proposed new § 23.1353(h) would require that, in the event of a complete loss of the primary electrical power generating system, airplane battery capacity must be sufficient to supply at least 30 minutes of electrical power to those loads essential to the continued safe flight and landing of the airplane.

No comments were received on this proposal, and it is adopted as proposed.

Section 23.1359 Electrical System Fire Protection

Proposed new § 23.1359 would require smoke and fire protection for electrical system installations. Proposed § 23.1359(a) would state that electrical systems must meet the applicable requirements of §§ 23.863 and 23.1182.

Proposed § 23.1359(b) would require that the electrical systems components installed in designated fire zones and used during emergency procedures be fire resistant. This provision is needed to clarify the requirements for electrical system components that may be installed in the designated fire zones identified in § 23.1181.

Finally, § 23.1359(c) would provide burn criteria for electrical wire and cables. A revision to appendix F of part 23 that would add appropriate wire testing criteria was also included in this proposal.

No comments were received on the proposals, and they are adopted as proposed.

Section 23.1361 Master Switch Arrangementt

To harmonize with the JAR this proposal would revise § 23.1361(c) by making an editorial change to remove the last two words of the paragraph that read "in flight." This change will not alter the meaning of the requirement.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.1365 Electrical Cables and Equipment

This proposal would revise § 23.1365(b) and would add three new paragraphs.

Section 23.1365(b) would be revised in relation to proposed new § 23.1359(c), which would require self-extinguishing insulated electrical wires and cables. The proposed revisions to § 23.1365(b) would remove the reference to electrical cables from the flame resistance requirement since the cables would be required to have self-extinguishing insulation under § 23.1359(c). The proposed revision retains the requirement for electrical cables and associated equipment to not emit dangerous quantities of toxic fumes when they overheat. The phrase "at least flame resistant" in § 23.1365(b) would also be revised by removing the words "at least."

The three paragraphs that would be added by this proposal would require: (1) The identification of electrical cables, terminals, and connectors; (2) the protection of electrical cables from damage by external sources; and (3) installation criteria for cables that cannot be protected by a circuit protection device.

No comments were received on the proposals, and they are adopted as proposed.

Section 23.1383 Taxi and Landing Lights

The landing light requirements of § 23.1383 would be revised by adding taxi lights to this section.

Current § 23.1383(a), which requires the lights to be acceptable, would be deleted because it is unnecessary to state this. The paragraphs would be redesignated accordingly.

Current § 23.1383(b)(3) requires that a landing light must be installed to provide enough light for a night landing. Proposed § 23.1383(c) would revise "night landing" to "night operation" since the requirements would also cover taxiing and parking. Proposed new paragraph (d) would require the lights to be installed so that they do not cause a fire hazard.

No comments were received on the proposals for this section, and they are adopted as proposed.

Section 23.1401 Anticollision Light System

This proposal would revise § 23.1401 to require the installation of an anticollision light system on all part 23 airplanes.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.1413 Safety Belts and Harnesses

The proposals in the notice did not include a revision that would remove this section. However, comments received on the notice proposal for § 23.785 showed that the proposed change, along with the retention of this section could be confusing and, thereby, not accomplish the FAA's intent to clarify the seat requirement.

Section 23.1413 is being removed, and the phrase "with metal-to-metal latching device" is being added to §§ 23.785(b) and 23.785(c) to accomplish the intended clarification identified in this notice. This change will not add a substantive requirement.

Section 23.1431 Electronic Equipment

This proposal would add three new paragraphs to § 23.1431. Proposed new paragraph (c) would provide that airplanes required to be operated by more than one flightcrew member be evaluated to determine if the flightcrew members can converse without difficulty when they are seated at their duty stations. Proposed new paragraph (d) would require installed communication equipment to use "off-on" transmitter switching that will ensure that the transmitter is turned off when it is not being used. Proposed new paragraph (e) would require that, if provisions for communication headsets are provided, the applicant must demonstrate that flightcrew members will receive all warnings when a headset is being used. The

demonstration must be made under actual cockpit noise conditions.

The Air Line Pilots Association (ALPA) submitted the only comment on this proposal. ALPA expressed concern over the cockpit noise conditions that would be used in the determination of compliance with proposed paragraphs (c) and (e).

This notice preamble identified an earlier harmonization consideration to include text in JAR 23 and this proposal that would have required compliance under actual cockpit noise conditions. The preamble explained that this text was not included because it may be misinterpreted and result in demonstrations being conducted under more severe noise conditions than are needed. ALPA understood this explanation to mean that the FAA had made a determination that compliance demonstrations should not be conducted under the actual cockpit noise conditions that exist when the airplane is being operated. ALPA recommends that the FAA re-evaluate its position.

The FAA has reviewed the record of earlier harmonization discussions where the concerns about noise conditions were first considered. During these discussions, which included industry representatives, it was decided that any requirement for testing under noise conditions could be interpreted to require testing under conditions that were more severe than needed. Accordingly, it was decided that such text should not be included in either JAR or part 23. The FAA agreed with the position reached in these discussions; therefore, these proposals did not include any requirements for testing under noise conditions, and the explanation was placed in the notice to identify why such requirements were not included.

Earlier harmonization and this comment make it clear that the proposals, with or without the requirements for testing under noise conditions, may be misinterpreted. ALPA's interpretation that the FAA had determined that the demonstrations of compliance with these requirements should not be conducted under actual cockpit noise conditions, is not correct. The test for compliance with the requirements should be done under the actual noise conditions.

To clarify the conditions under which these evaluations should be conducted, not withstanding earlier harmonization agreements, these two paragraphs are being revised to include the phrase, "under actual cockpit noise conditions when the airplane is being operated."

The proposals for § 23.1431 are adopted with the above-identified revision of paragraphs (c) and (e).

Section 23.1435 Hydraulic Systems

Since the adoption of Amendment No. 23–43 (58 FR 18958, April 9, 1993), the FAA has received questions about the installation of hydraulic accumulators that are permitted by § 23.1435(c). These questions have shown that applicants find § 23.1435(c) difficult to understand. The notice proposed a revision of § 23.1435(c) to clarify the type and size of a hydraulic accumulator or reservoir that may be installed on the engine side of any firewall.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.1447 Equipment Standards for Oxygen Dispensing Units

If radio equipment is installed, proposed new § 23.1447(a)(4) would require that flightcrew oxygen dispensing units be designed to allow the use of communication equipment when oxygen is being used.

Revisions to § 23.1447(d) would require the flightcrew oxygen dispensing units to either be the quick donning type or be automatically presented before the cabin pressure altitude exceeds 15,000 feet, if the airplane is certificated for operation above 25,000 feet. The passenger oxygen requirements of former paragraph (e) and (e)(1) have not been revised, but are now contained in new paragraph (e). Proposed paragraph (d) would be revised to provide the flightcrew and the airplane passengers the same level of safety as required by other airworthiness standards (14 CFR part 25). This proposed revision is also consistent with the proposed revision of § 23.841.

No comments were received on the proposals for this section, and they are adopted as proposed.

Section 23.1451 Fire Protection for Oxygen Equipment

This proposed new section would specify fire protection for oxygen equipment installations. Section 23.1451(a) and (b) would, respectively, prohibit the installation of oxygen equipment in designated fire zones and require that oxygen system components be protected from the heat from designated fire zones. Proposed § 23.1451(c) would require oxygen equipment and lines to be installed so that escaping oxygen cannot come in contact with grease, fluids, or vapors that may be present.

No comments were received on the proposal for this section, and it is adopted as proposed.

Section 23.1453 Protection of Oxygen Equipment From Rupture

Proposed new § 23.1453 would clarify the rupture protection needed for oxygen system installation. Rupture protection for oxygen systems is currently required by the application of the structure load requirements of part 23. The addition of § 23.1453(a) would clarify the application of these load requirements and would identify the need to consider maximum temperatures and pressures that may be present. Section 23.1453(b) would identify the protection to be provided for high pressure oxygen sources and the pressure lines that connect such sources to the oxygen system shutoff valves.

The comments received on this proposal from the JAA and the CAA noted that the word "high" in paragraph (b) could lead to confusion and require interpretation. Accordingly, they suggested that the words "High pressure oxygen sources" be revised to read as follows: "Oxygen pressure sources." This is the same text that is used in JAR 23.

The FAA agrees with the suggested wording change. When the proposal was originally drafted, the FAA was considering the oxygen source side of the oxygen regulator, the high pressure side, and the passenger dispensing side of the regulator, the low pressure side; thus, the word "high" was used.

The suggested change will not alter the requirement's applicability and will be more clearly understood. It is also noted that the suggested text change will more closely align with the same requirement in § 25.1453. Section 23.1453 is changed by revising the first four words of proposed paragraph (b) to read, "Oxygen pressure sources."

This section is adopted with the above change.

Section 23.1461 Equipment Containing High Energy Rotors

This proposal would revise paragraph (a) of this section to clarify that the requirements apply to high energy rotors included in an auxiliary power unit (APU).

One comment was received on this proposal. The JAA and the CAA noted that the JAA does not agree that the requirements of this section are applicable to APU's. They suggest that the proposed changes to paragraph (a) not be adopted.

In the preamble of the notice, the FAA identified policy issued after this

section was adopted. That policy indicated that the section was applicable to "equipment such as APU's and constant speed drives," but this policy was not widely distributed to all FAA offices. The proposal in the notice does not alter the policy applicability, but it does clarify the policy.

Removing the proposed change would not alter the situation. The FAA defines "Equipment containing high energy rotors" to include APU's and constant speed drives. In cases where rotor containment has been demonstrated by complying with JAA–APU or FAA TSO C77a, this compliance will be examined by the FAA office responsible for the airplane certification. If it is found that this demonstration also meets the requirements of § 23.1461, it will be accepted for the airplane's compliance.

The proposal for § 23.1461 is adopted as proposed.

Appendix F to Part 23—Test Procedure

This proposal would revise appendix F to provide the procedures needed to test electrical wire to ensure that the wire meets the burn requirements of § 23.1359. It would also add procedures for meeting the 45 degree and 60 degree angle burn test requirement proposed in §§ 23.855(c)(2) and 23.1359(c), respectively. Paragraph (b) would clarify the specimen configuration to be used in the proposed testing procedures.

No comments were received on the proposals, and they are adopted as proposed.

Section 91.205 Powered Civil Aircraft With Standard Category U.S. Airworthiness Certificates: Instrument and Equipment Requirements

Proposed new § 91.205(b)(11) would require that airplanes certificated under § 23.1401 be equipped with an anticollision light system for day visual flight rule (VFR) operations. Day VFR operations are discussed under § 23.1401 of the notice.

No comments were received on the proposed addition to this section, and that addition is adopted as proposed.

Section 91.209 Aircraft Lights

Proposed new § 91.209(b) would require that airplanes equipped with an anticollision light system be operated with the anticollision light system lighted during all types of operations, except when the pilot determines that, because of operating conditions, it would be in the interest of safety to turn the lights off.

One commenter believes that the proposal is unacceptable to aircraft operators. This commenter contends that the midair collision statistics are purely conjectural and that any safety benefits are merely guesswork. The commenter also notes that this change would affect an aircraft's dispatch capability, and questions why an airplane that is perfectly capable of being flown should be grounded from daytime flight because something, such as a lamp, is defective.

The FAA agrees that there will be incidents where an airplane will be temporarily grounded from daylight operations until a failure in the light system can be repaired. However, the additional safety cue provided to pilots by operating anticollision light systems will outweigh the cost of maintaining the light system.

The proposed revision of § 91.209 is adopted as proposed.

Regulatory Evaluation, Regulatory Flexibility Determination, and Trade Impact Assessment

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that Federal agencies promulgate new regulations or modify existing regulations only if the potential benefits to society justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Finally, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these assessments, the FAA has determined that this rule: (1) Will generate benefits exceeding its costs and is "significant" as defined in the Executive Order 12866; (2) is "significant" as defined in DOT's Policies and Procedures; (3) will not have a significant impact on a substantial number of small entities; and (4) will not constitute a barrier to international trade. These analyses, available in the docket, are summarized below.

Regulatory Evaluation Summary

This section summarizes the costs and benefits of each provision of the final rule. Many of the provisions in the final rule will impose either no cost or a negligible cost. Such provisions are typically administrative, editorial, clarifying, relieving, or conforming in nature. In addition, the FAA holds that certain provisions have a potential safety benefit that can be achieved with no incremental cost, due primarily to the fact that this rule will apply to future certificated airplanes and retrofitting will not be required. All provisions of the final rule, including those with no or negligible costs, are summarized below. Only those provisions with non-negligible costs are further evaluated in the section that follows. It should be noted that the various cost impacts are not additive since the individual provisions often apply to different airplane types included under part 23. The reader is directed to the full regulatory evaluation in the docket for additional information.

Section		Incremental cost	Benefit
Section 23.677	Trim systems	Negligible	Safety.
Section 23.691	Artificial stall barrier system	None	Administrative.
Section 23.697	Wing flap controls	$480 per certification and $100 per airplane for affected airplanes.	Nominal safety and relief.
Section 23.701	Flap interconnection	None	Clarification.
Section 23.703	Takeoff warning system	$240 per certification for evaluation. Where necessary, $5,120 per certification, $1,000 per airplane and $100 per year.	Nominal safety and relief.
Section 23.723	Shock absorption tests	None	Editorial.
Section 23.729	Landing gear extension and retraction system.	¶ (e). None	Clarification.
		¶ (g). Negligible, general practice	Minor; general practice.
Section 23.735	Brakes	¶ (a). None	Editorial clarification.
		¶ (c). None	Administrative.
		¶ (e). $240 per certification	Minor safety.
Section 23.745	Nose/Tail wheel steering	None	Minor. Avoids special conditions.
Section 23.775	Windshields and windows	¶ (a). None	Relieving.
		¶ (c). None	Clarification.

Section	Incremental cost	Benefit
	¶ (h). Up to $350,000 per certification	Safety.
Section 23.783 Doors	¶ (b). None	Minor safety.
	¶ (g). $25 per airplane	Safety.
Section 23.785 Seats, births, litters, safety belts and shoulder harnesses.	None	Editorial organization.
Section 23.787 Baggage and cargo compartments.	¶ (a)$1 per airplane	Minor safety.
	¶ (b). $60 per certification and up to $100 per airplane.	Safety.
	¶ (c). None	Clarification.
Section 23.791 Passenger information signs	$60 per clarification, up to $200 per airplane, and a negligible effect on operating costs.	Safety.
Section 23.807 Emergency exists	¶ (a)(4). Expected negligible	Minor safety.
	¶ (b) and (b)(5). None	Clarification and editorial.
	¶ (b)(6). Where chosen, $10,000 per certification and $500 per airplane.	Safety.
Section 23.841 Pressurized cabins	$1,000 per certification and $2,000 per airplane.	Safety.
Section 23.853 Passenger and crew compartment interiors.	None	Editorial.
Section 23.855 Cargo and baggage compartment fire protection.	¶ (a). Less than $40 per airplane	Minor safety.
	¶ (b). Less than $200 per airplane	Safety.
	¶ (c). Potentially as high as $1,800 per certification, $4,550 per airplane, and $100 per year.	Safety.
Section 23.867 Electrical bonding and protection against lightning and static electricity.	None	Editorial.
Section 23.1303 Flight and navigation instruments.	Introduction. None	Clarification.
	¶ (d). Negligible	Safety.
	¶ (e)(2). None	Minor safety.
	¶ (f). None	Minor safety.
	¶ (g)(1). Up to $2,000 per airplane	Safety.
	¶ (g)(2). None	Minor safety.
	¶ (g)(3). Up to $3,600 per certification and $7,000 per airplane.	Safety.
Section 23.1307 Miscellaneous equipment	None	Editorial and conforming.
Section 23.1309 Equipment, systems, and installations.	None	Minor safety.
Section 23.1311 Electronic display instrument systems.	None	Clarifying, editorial, and relieving.
Section 23.1321 Arrangement and visibility	None	Minor safety.
Section 23.1323 Airspeed indicating system	None	Minor safety.
Section 23.1325 Static pressure system	None	Relieving.
Section 23.1326 Pitot heat indication system	$2,800 per certification, $1,600 per airplane	Safety.
Section 23.1329 Automatic pilot system	None	Clarifying.
Section 23.1337 Powerplant instruments installation.	Heading and ¶ (b). None	Clarifying, relieving.
	¶ (b)(4). Negligible	Safety.
Section 23.1351 General	¶ (b). None	Administrative.
	¶ (c)(3). None	Clarifying.
	¶ (f). None	Minor safety.
Section 23.1353 Storage battery design and installation.	Where necessary, up to $30 per five years capital, up to $10 per year operating, and $600 per certification.	Safety.
Section 23.1359 Electrical system fire protection.	¶ (a). None	Clarifying emphasis.
	¶ (b). Negligible	Clarifying.
	¶ (c). $240 per certification	Safety.
Section 23.1361 Master switch arrangement	None	Editorial.
Section 23.1365 Electrical cables and equipment.	¶ (b). None	Conforming editorial.
	¶ (d). $4,400 per certification and $100 per airplane.	Safety.
	¶ (e). None	Minor safety.
	¶ (f). Negligible	Minor safety.
Section 23.1383 Taxi and landing lights	None	Editorial update.
Section 23.1401 Anticollision light system	Where necessary, $2,400 per certification and $1,600 per airplane.	Safety.
Section 23.1431 Electronic equipment	¶ (c). Where necessary, up to $1,200 per certification and $1,600 per airplane.	Safety.
	¶ (d). Negligible. Included above	Minor safety.
	¶ (e). None or negligible	Safety.

Section	Incremental cost	Benefit
Section 23.1435 Hydraulic systems	None	Clarifying.
Section 23.1447 Equipment standards for oxygen dispensing units.	¶ (a)(4). Up to $2,000 per airplane	Safety.
	¶'s (d) and (e). None	Minor safety.
Section 23.1451 Fire protection for oxygen equipment.	None	Safety.
Section 23.1453 Protection of oxygen equipment from rupture.	$960 per certification	Safety.
Section 23.1461 Equipment containing high energy rotors.	None	Clarifying.
Appendix F to Part 23—Test Procedure	None. Considered above	Minor safety.
Section 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.	None	Safety, considered above.
Section 91.209 Aircraft lights	$25 per year per airplane	Safety, considered above.

Evaluation of Provisions With Non-Negligible Projected Costs

This section describes and evaluates those provisions of the rule that are expected to impose costs that are not negligible.

Section 23.697 Wing Flap Controls

New § 23.697(c) provides safety standards for the wing flap control lever installed in airplanes that use wing flap settings other than fully retracted when showing compliance with § 23.145. The FAA estimates that an aerospace engineer could design the flap control lever to meet the requirement in 8 hours at a burdened rate of $60 per hour, totalling $480 per certification. The control lever itself would impose an incremental cost, including installation, of approximately $100 per airplane.

The nominal benefits of this provision will derive from the increased safety afforded the pilot in positively selecting the proper flap setting to maintain longitudinal control. In fact, if a flap position other than fully retracted were needed to maintain longitudinal control: (1) That position would be necessary to prevent an unsafe condition, (2) the airplane would not be certificated under that design, and (3) the airplane would have to be redesigned so that intermediate flap positions would not be needed for control. Paragraph (c) will allow the identification of an intermediate flap position and the positive means of selecting that position. This alternative would rectify the unsafe condition without requiring the manufacturer to redesign the airplane.

Section 23.703 Takeoff Warning System

This new section requires that a takeoff warning system on some commuter category airplanes. The requirement will apply if a flight evaluation shows that an unsafe takeoff condition would result when lift devices on longitudinal trim devices are set to any position outside the approved takeoff range. If the evaluation shows that no unsafe condition could result at any setting of these devices, a takeoff warning system will not be required. For those airplanes on which a warning system must be installed, the rule will provide requirements for the installation of the system.

The FAA estimates that an evaluation to determine whether a takeoff warning system is needed will cost $240 (4 hours of engineering at a burdened rate of $60 per hour). Where needed, the integration design of a warning system will cost $2,400 (40 hours at $60 per hour). In addition, an incremental 4 hours of flight testing at a cost of $2,720 ($500 per hour for two test pilots and $180 per hour for fuel) will be needed to demonstrate the system's performance. The FAA estimates that the system, including acquisition, wiring, micro switches, and labor, will add approximately $1,000 to the cost of each airplane required to have one. Maintenance of such a system will cost approximately $100 per year.

The nominal benefit of this provision derive from the increased safety provided by the takeoff warning system that would activate whenever lift or longitudinal trim devices are not set within their approved takeoff ranges. If an evaluation showed that positions of the lift or longitudinal trim devices could create an unsafe condition on takeoff, the manufacturer is required, under existing regulations, to redesign the devices so that the unsafe positions could not be obtained. The new section will provide relief by allowing the applicant to install a warning system rather than redesigning the trim device(s).

Section 23.735 Brakes

New § 23.735(e), applicable to commuter category airplanes, requires establishing the minimum rejected takeoff brake kinetic energy capacity rating of each main wheel brake assembly. Based on the operating experience of airplanes used in passenger-carrying operations, existing § 23.45 requires the determination of the accelerate-stop distance for commuter category airplanes. New § 23.735 is needed to ensure that the brakes will perform safely under accelerate-stop conditions.

Under the final rule, manufacturers of commuter airplanes may determine the kinetic energy absorption requirements either through a conservation, rational analysis of the sequence of events expected during a rejected takeoff, or by using the formula in new § 23.735(e)(2). The FAA estimates that the determination will cost $240, based on four hours of engineering at a burdened rate of $60 per hour. The potential benefits of the requirement derive from the added safety that will be provided by establishing beforehand the minimum necessity kinetic energy capacity rating of each main wheel brake assembly under rejected takeoff conditions.

Section 23.775 Windshields and Windows

Introductory text and paragraph (h)(1) are added to require that commuter category windshield panes that are directly in front of the pilots be able to withstand the impact of a two pound bird at maximum approach flap speed. By requiring full protection against the strike of a two-pound bird at approach speed, additional protection will also be provided if the airplane strikes a larger bird or strikes a bird at a higher speed.

New § 23.775(h)(2) further requires the panels of the windshield to be so

arranged that, if one is damaged, other panels will remain to provide visibility for continuous safe flight and landing.

The potential cost of § 23.775(h) will vary depending on circumstances of the affected manufacturer. Industry sources estimate that the total nonrecurring cost per certification will range from $250,000 to $350,000, consisting of: (1) Up to $200,000 for a bird strike test article ("bird gun") if the manufacturer does not have one; and (2) up to $150,000 of time and materials cost for the actual testing.

A manufacturer that has a bird strike test article will not incur additional capital test costs. Most manufacturers will incur up to $150,000 in time and materials costs for the actual testing, but even these costs could be mitigated by the existing need of most manufacturers to perform such tests for export sales to JAA member countries.

Industry sources estimate that there will be no identifiable increment in design or tooling costs since the windshield is an integral part of the initial design. Similarly, little or no recurring costs per airplane (incremental materials, installation, or weight) are projected since it is reasonable to assume that the pressure load, as compared to bird strike resistance, will be the controlling factor in windshield design strength.

The benefit of the revision is the incremental protection against bird strikes that would be afforded to commuter category airplanes. The FAA has reviewed International Civil Aviation Organization (ICAO) data on bird strikes that occurred on member country airplanes weighing 19,000 or fewer pounds from 1981 through 1989. These data shows that approximately 550 strikes occurred and that one out of seven hits the windshield. The data show that:

1. Almost 52 percent of the strikes occurred at altitudes of less than 100 feet, and 26.7 percent occurred between 101 and 1000 feet.

2. Eighty-five percent of the strikes occurred at airspeeds of 150 knots or less.

3. Where bird types were reported, 27.6 percent of strikes involved small birds and 58.6 involved medium size birds (2 pounds or less).

4. Incidents where the airplane was damaged showed that 16.9 percent resulted from small bird strikes and 64 percent resulted from medium size bird strikes.

These data show that most bird strikes occur at takeoff and landing airspeeds, and that birds weighing two pounds or less are struck most often. The standards of the final rule are based on these statistics. Few fatalities and injuries resulted from the bird strikes reported in the ICAO data. Similarly, a review of NTSB accident records between 1982 and 1992 revealed no U.S. accidents resulting from bird strikes to the windshields of commuter category airplanes. As a result, the FAA cannot justify this provision solely on the basis of historical accidents. Instead, the standards are based on the expert recommendations of the ARAC. It is also noted that this standard will be applied to JAA certifications and that U.S. manufacturers wishing to export to JAA countries will be required to meet the standard.

Section 23.783 Doors

New paragraph (g) requires that the locks on lavatory doors, if installed, be designed so that they will not trap occupants. Lavatory door locks used in transport category airplanes (see § 25.783) meet the requirements of this rule. The FAA estimates that the incremental cost of this provision would be no more than $25 per lock. The rule will reduce the likelihood that occupants would be trapped in a locked lavatory, both in emergency and non-emergency situations.

Section 23.787 Baggage and Cargo Compartments

The final rule extends to normal, utility, and acrobatic airplanes the existing commuter requirement to prevent baggage from hazardous shifting. The FAA estimates that an aerospace engineer can analyze the subject loads that would need to be constrained in 1 hour, at a burdened cost of $60 per hour. Tiedowns will cost approximately $50 per baggage compartment, or no more than $100 per airplane. These additional costs apply to normal, utility, and acrobatic airplanes since commuter category airplanes are already subject to the requirement under the existing rule.

The potential benefits of the provision include the reduced likelihood: (1) That baggage compartments would be overloaded, (2) that stowed baggage would shift dangerously, and (3) that essential co-located equipment or wiring would be damaged.

Section 23.791 Passenger Information Signs

This new section requires at least one illuminated sign notifying all passengers when seat belts should be fastened. The requirement will apply only to airplanes where flightcrew members cannot observe occupant seats or where the flightcrew compartment is separated from the passenger compartment. The signs will have to be legible to all seated passengers and to be operable from a crewmember station.

The FAA estimates that an aerospace engineer could design the required sign in 1 hour, at a burdened rate of $60 per hour. The sign would cost approximately $200 per airplane, including parts and installation. Maintenance costs for bulb replacement will be negligible. The weight penalty associated with the light system would also be minor (no more than 2 pounds).

The safety benefits of the change will derive from the increased likelihood that passengers will know when their seat belts should be fastened.

Section 23.807 Emergency Exits

New § 23.807(a)(4) provides the same hazard protection for a person using an emergency exit as that provided by revised § 23.783(b) for a person who uses a passenger door. Emergency exits will not be allowed to be located with respect to a propeller disk or any other hazard in a manner that will endanger persons using that exit.

The FAA holds that no incremental cost will be incurred to meet the standards of the provision for newly certificated airplanes. No comments to the NPRM were received on the potential costs and methods of compliance that manufacturers would choose to comply with this requirement.

Section 23.807(b)(5) revises the current egress requirements for acrobatic airplanes. Section 23.807(b)(6) establishes similar egress standards for utility category airplanes that are certificated for spinning. Industry sources estimate that an aerobatic, quick-release door will cost an incremental $10,000 in engineering design per affected airplane model and an additional $500 per production airplane. Little or no additional weight is expected. These costs will apply only in cases where the manufacturer determines that the marketplace return of a combination type certificate would outweigh the additional costs of design and production.

Section 23.841 Pressurized Cabins

The revision to § 23.841(a) extends the cabin pressure requirements of current paragraph (a), which apply to airplanes certificated for operation above 31,000 feet, to airplanes certificated for operation above 25,000 feet. Current part 25, JAR 25, and proposed JAR 23 include the same requirement. This revision is intended to protect airplane occupants if a malfunction occurs at altitudes where symptoms of hypoxia occur, usually above 25,000 feet.

For airplanes that will be certificated for maximum altitude operation between 25,000 feet and 31,000 feet, the provision requires two additional pressure altitude regulators and associated plumbing. Industry sources estimate that the requirement will cost an incremental $1,000 in engineering design per affected airplane model and $2,000 per production airplane. Any additional weight will be negligible.

The benefits of the proposal derive from the incremental protection against hypoxia afforded to occupants of airplanes certificated for maximum altitudes between 25,000 and 31,000 feet. Due to the increasing use of turbine engines, more part 23 airplanes are likely to be approved for operation above 25,000 feet. In the absence of this rule, an increasing number of occupants would be exposed to the potential for harm in the event of a failure or malfunction of the pressure system on these airplanes.

Section 23.855 Cargo and Baggage Compartment Fire Protection

Paragraph (a) requires all sources of heat within each cargo and baggage compartment that are capable of igniting the compartment contents to be shielded and insulated to prevent such ignition. Existing § 23.787(f) requires that cargo compartment lamps be installed so as to prevent contact between the lamp bulb and cargo. The final rule will clarify and extend this provision to include all sources of heat for baggage as well as cargo compartments.

Lights and (rarely) heaters for pets are typically the only sources of heat located in a baggage or cargo compartment. A wire cage, costing no more than $20, around the heat source would meet these requirements. The FAA estimates that the total cost of compliance per airplane will be no more than $40 in those rare cases where such protection would not have been provided anyway. The benefit of the proposed provision is a reduction in the possibility of fire caused by the ignition of compartment contents by lights or heaters.

Paragraph (b) requires cargo and baggage compartments to be constructed of materials that meet the appropriate provisions of § 23.853(d)(3). Currently these requirements apply to commuter category airplanes and to the materials used in the compartments of these airplanes. The new requirement extends this applicability to the cargo and baggage compartments of all part 23 airplanes. In effect, the new requirement requires materials that are self-extinguishing, rather than flame resistant, as currently required under § 23.787(d).

Information provided by manufacturers shows that materials that meet self-extinguishing flame requirements are available at a slightly higher cost than materials that meet only flame resistant requirements. The FAA conservatively estimates that the incremental costs of complying with § 23.855(b) will be less than $200 per airplane. The safety benefits of this provision will be an increase in cargo and baggage compartment fire protection.

New paragraph (c) adds new fire protection requirements for cargo and baggage compartments for commuter category airplanes. The rule requires one of the following three alternatives:

(1) The compartment must be located where pilots seated at their duty station would easily discover the fire, or the compartment must be equipped with a smoke or fire detector system to provide a warning at the pilot's station. The compartment must also be accessible for fire extinguisher application.

(2) The compartment may be inaccessible, but must be equipped with a fire detector system that provides a warning at the pilot's station, and the compartment must have ceiling and sidewall floor panels constructed of materials that have been subjected to and meet the vertical self-extinguishing tests of appendix F to part 23.

(3) The compartment must be constructed and sealed to contain any fire.

The FAA cannot predict the designs of cargo and baggage compartments for future airplanes. If manufacturers choose to use smoke detectors, however, no more than 2 smoke detectors would be required per airplane. An aerospace engineer can design the smoke detector system in approximately 30 hours at a burdened rate of $60 per hour, for a total cost of $1,800 per certification. Two detectors, including wiring and installation, are estimated to cost about $4,550. Maintenance costs for the smoke detectors will cost approximately $100 per year.

Materials that meet the vertical self-extinguishing tests of appendix F (alternative 2 in the discussion above) will result in incremental costs of less than $200 per airplane. For alternative 3, the FAA estimates that it will cost $500 to construct a sealed compartment, or a total of $1,000 for 2 compartments, if the manufacturer chooses that method of complying with the proposed requirement.

Irrespective of the individual compliance method, the benefits of the provision will come from the increased likelihood that a cargo or baggage compartment fire could either be extinguished or contained.

Section 23.1303 Flight and Navigation Instruments

Revised § 23.1303(d) adds the requirement for a free air temperature indicator for those airplanes whose performance must be based on weight, altitude, and temperature. This requirement already applies to turbine-powered airplanes. The final rule extends the requirement to reciprocating engine-powered airplanes of more than 6,000 pounds. Manufacturers currently include free air temperature indicators as standard equipment on all part 23 airplanes, and would continue to do so in future designs in the absence of the requirement. Since the provision formalizes current practice, any costs would be negligible. Benefits will accrue from the requirement that the information necessary to determine the performance envelope of the airplane be available to the pilot.

New § 23.1303(g) identifies specific instruments, and the limits of those instruments, required for commuter category airplanes. New § 23.1303(g)(1) states that if airspeed limitations vary with altitude, the airspeed indicators must show the variation of the maximum operating limit speed (V_{MO}) with altitude. Industry sources indicate that an airspeed indicator with a V_{MO} "pointer" would cost $1,000 more than one without. Since two airspeed indicators are required on commuter airplanes, the incremental cost of this requirement will be $2,000 per commuter category airplane produced. The potential safety benefit of the requirement derives from the requirement that the information necessary to determine the maximum operating limit speed be available at all altitudes.

New § 23.1303(g)(3) requires (for commuter category IFR-approved airplanes with passenger seating configurations of 10 or more) a third, independent, attitude indicator (AI). Industry sources estimate that an aerospace engineer can design and document a third attitude instrument system in 100 hours at a burdened rate of $60 per hour, totalling $6,000 per certification. It is estimated that an AI will cost approximately $8,000, including a standby battery, and that the installation will cost $2,200 for 40 hours of a mechanic's time at a burdened rate of $55 per hour. However, § 23.1311(a)(5), discussed below, deletes the requirement for a rate-of-turn indicator when an independent attitude indicator is installed. The costs

associated with a rate-of-turn indicator include: 40 hours of design and documentation costs, $1,000 per indicator, and 40 hours of installation. Therefore, the *incremental* cost for an IFR-approved airplane with a passenger seating capacity of 10 or more will be $3,600 per certification for 60 hours of engineering (100 hours for the AI, minus 40 hours for the rate-of-turn indicator); and $7,000 per airplane for the instrument ($8,000 for the AI, minus $1,000 for the rate-of-turn indicator); and no additional cost for the installation (40 hours for the AI, minus 40 hours for the rate-of-turn indicator).

The potential safety benefits of a third, independent attitude indicator derive from the reduced potential for erroneous attitude information. Currently, two attitude instruments are required for a ten passenger, IFR-approved commuter category airplane. Service experience has shown that a failure can occur whereby an attitude indicator can appear to be working when it is actually providing incorrect information. During such a failure, pilots may have difficulty determining which instrument to follow, and hazardous flight attitudes may result. A third attitude indicator will allow the crew to retain reliable attitude information even in cases where one instrument is not operating correctly.

Section 23.1326 Pitot Heat Indication System

New § 23.1326 requires the installation of a pitot tube heat indicating system on those airplanes required to be equipped with a heated pitot tube. Heated pitot tubes ensure that moisture will not freeze in the tube and block or partially block the airspeed system.

A pitot heat indicating system, including an in-line current sensor, panel light, and associated wiring, costs approximately $500. According to industry sources, an aerospace engineer can design and document such a system in 20 hours at a burdened rate of $60 per hour, totalling $1,200. A mechanic can install the system in 20 hours at a burdened rate of $55 per hour, totalling $1,100. The estimated non-recurring cost per certification, therefore, will total $2,800 ($1,200 for design, $500 for the certification airplane's indicator, and $1,100 for installation of that indicator). The estimated cost per production airplane will be $1,600 ($500 for the system and $1,100 for installation).

A pitot heat indicating system can advise the pilots of any inoperative heating element in the pitot tube and that subsequent inaccuracies could result. The provision will reduce the likelihood that pilots would rely on inaccurate airspeed information resulting from a blocked or partially blocked pitot tube.

Section 23.1353 Storage Battery Design and Installation

New § 23.1353(h) requires that, in the event of a complete loss of the primary electrical power generating system, airplane battery capacity must be sufficient to supply at least 30 minutes of electrical power to those loads essential to the continued safe flight and landing of the airplane.

In some cases, manufacturers may need to install larger batteries with greater capacities to comply with the requirements. The FAA estimates that the size and capacity of a larger battery will add no more than a few pounds (incremental operating costs of less than $10 per year) and $20 to $30 of additional cost for the battery.

On some airplanes, a "load shedding" procedure, where the pilot would sequentially turn off certain equipment, could be required either in place of or in addition to a larger battery. The procedure would be provided in the pilot's operating handbook (POH). The FAA estimates that an aerospace engineer can establish a load shedding procedure in 10 hours at a burdened rate of $60 per hour, for a total cost of $600 per affected certification.

Irrespective of the method of compliance, the provision will increase the likelihood that sufficient electrical power will be available to safely land the airplane in the event of an electrical generating system failure.

Section 23.1359 Electrical System Fire Protection

Revised § 23.1359(c) provides burn criteria for electrical wire and cables. A revision to appendix F to part 23 adds appropriate wire testing criteria. Demonstrating and documenting that electrical wires and cables meet the requirements of this provision will take an aerospace engineer approximately 4 hours at a burdened rate of $60 per hour, for a total cost of $240 per certification. The requirement and testing criteria increase the likelihood that necessary wires and cables will continue to function in the event of a fire.

Section 23.1365 Electrical Cables and Equipment

Section 23.1365(d) adds a requirement for the identification of electrical cables, terminals, and connectors. Different colored wires and/or tags could be used in conjunction with a wiring diagram to identify the cables, terminals, and connectors. The FAA estimates that a draftsman can design and document this identification system in 80 hours at a burdened rate of $55 per hour, a total of $4,400 per certification. Incremental installation costs will be approximately $100 per airplane.

The increasing use of electrical systems in part 23 airplanes has added to the difficulty of wiring installation. The requirement for cable identification will increase the likelihood that cables are correctly installed initially and will be correctly reinstalled as part of later maintenance or modification.

Section 23.1401 Anticollision Light System

The final rule revises § 13.1401 to require the installation of an anticollision light system on all part 23 airplanes. Existing § 23.1401 requires an anticollision light system only if certification for night operations is requested. Many manufacturers currently install anticollision light systems on all airplanes they produce.

Industry sources estimate that an aerospace engineer can design and document an anticollision light system in 40 hours at a burdened rate of $60 per hour, for a total of $2,400 per affected certification. The system will cost $500 and will take a mechanic approximately 20 hours to install at a burdened rate of $55 per hour, a total of $1,600 per affected airplane ($500 + (20 hours × $55 per hour) = $1,600). The weight penalty will be negligible. Only those future models that would not otherwise have anticollision light systems will actually incur incremental costs as a result of this provision.

The increasing speeds resulting from improved technology, especially turbine engines, warrant the use of anticollision lights for day operations as well as night. The reports of midair collisions for 1984 through 1990 document that 269 aircraft were involved in midair collisions in which 108 fatalities occurred. After data were filtered (to account for night operations, IFR conditions, and aircraft not affected by this rule), 167 airplanes were involved in collisions that occurred in daytime VFR conditions. The reports do not reveal whether the airplanes were using anticollision lights at the time of the accidents.

The FAA holds that requiring the installation of anticollision lights on all newly certificated airplanes, and requiring their use during day operations (revised § 91.209), will reduce the number of daylight midair accidents. Even if the requirement were

only 25 percent effective, the accident history indicates that approximately 17 fatalities could be avoided during a similar 6-year period.

Section 23.1431 Electronic Equipment

The final rule adds three new paragraphs to § 23.1431. New paragraph (c) states that airplanes required to be operated by more than one flightcrew member must be evaluated to determine if the flightcrew members, when they are seated at their duty stations, can converse without difficulty under the actual cockpit noise conditions when the airplane is being operated. If the required evaluation shows that the noise level does not impair conversation, no further action would be required. If the evaluation shows that conversation would be difficult, however, an intercommunication system will be required.

The FAA estimates that an evaluation of cockpit noise could be conducted in conjunction with other certification testing, therefore, no incremental costs are associated with the evaluation. An aerospace engineer could design an intercom system in 20 hours at a burdened rate of $60 per hour, for a total of $1,200 per affected certification. The FAA estimates that the addition of an intercom system will cost approximately $500 per airplane. A mechanic could install the system in approximately 20 hours at a burdened rate of $55 per hour. The total incremental production cost for an affected airplane, therefore, will be $1,600 ($500 + (20 hours × $55 per hour)).

New paragraph (d) requires that, if the communication equipment that is installed includes any means of switching from the receive mode to the transmit mode, the equipment must use "off-on" transmitter switching that turns the transmitter off when it is not being used. The cost of this feature is included in the $500 cost of the intercom, described above.

NTSB investigations of at least two commuter accidents determined that excessive cockpit noise levels probably adversely affected the ability of the flight crews to communicate. (Bar Harbor Airlines, Flight 1808, August 25, 1985, 8 fatalities; and Henson Airlines, Flight 1517, September 23, 1985, 14 fatalities.) As a result, the Board recommended (Recommendation No. A–86–113) that the FAA require the installation and use of crew interphone systems in the cockpit of airplanes operating under part 135. The benefit of the new requirement derives from the increased likelihood that flightcrew members will be able to converse without difficulty and that the safety hazard of miscommunication will be reduced.

Section 23.1447 Equipment Standards for Oxygen Dispensing Units

New § 23.1447(a)(4) requires that if radio equipment is installed in an airplane, flightcrew oxygen dispensing units must be designed to allow use of the communication equipment when oxygen is being used.

Industry sources estimate that an oxygen mask with an integral microphone costs $1,000 more than an oxygen mask without a microphone. The costs per affected airplane, therefore, will be $2,000 for two masks. The benefit of the requirement is that it will allow flightcrew communication under all operating conditions, including operations when oxygen is required.

Section 23.1453 Protection of Oxygen Equipment From Rupture

This new section clarifies the rupture protection needed for oxygen system installation. Rupture protection for oxygen systems is currently required by the application of the structures load requirements of part 23. The addition of § 23.1453(a) clarifies the application of these load requirements and identifies the need to consider maximum temperatures and pressures that may be present. Section 23.1453(b) identifies the protection to be provided for oxygen pressure sources and the lines that connect these sources to the oxygen system shutoff valves.

Industry sources estimate that an aerospace engineer could analyze and document the loads on each element of the oxygen system in 16 hours at a burdened rate of $60 per hour, for a total cost of $960. The routing of oxygen pressure sources and lines to protect them from unsafe temperatures and crash landings would be part of an airplane's basic design and will not impose incremental costs.

Section 91.209 Aircraft Lights

New § 91.209(b) requires airplanes equipped with an anticollision light system to operate those lights during all operations, including daytime VFR.

The incremental cost of this provision consists of light bulb replacement. The FAA estimates that a light bulb for an anticollision light system costs approximately $50 and that this provision would necessitate an incremental bulb replacement every two years. Accordingly, the cost is projected to equal $25 per year, per affected operating airplane. The FAA holds that any grounding of an airplane due to a faulty bulb or light system will be rare and quickly corrected. The cost of such grounding will be negligible, when compared with the safety benefits of operating anticollision light systems.

In summary, the FAA holds that the benefits of the rule, though not directly quantifiable, will exceed the expected costs. Each of the provisions, as well as the entire final rule, will be cost beneficial.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed or final rule would have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, establishes threshold cost values and small entity size standards for complying with RFA review requirements in FAA rulemaking actions. The Order defines "small entities" in terms of thresholds, "significant economic impact" in terms of annualized costs thresholds, and "substantial number" as a number which is not less than eleven and which is more than one-third of the small entities subject to the proposed or final rule.

Order 2100.14A specifies a size threshold for classification as a small manufacturer as 75 or fewer employees. There are approximately 8 small part 23 airplane manufacturers. The annualized cost threshold for significant impact, expressed in 1995 dollars, is $18,700. No part 23 airplane manufacturer's annualized cost will exceed this cost threshold.

Order 2100.14A specifies a size threshold for classification as a small operator as 9 aircraft owned. The annualized cost threshold for significant impact, expressed in 1995 dollars, are $67,000 for air carriers whose fleet has a seating capacity of fewer than 60 and $4,700 for an unscheduled operator. No part 23 airplane operator's annualized cost will exceed this cost threshold.

The amendments in the final rule, therefore, will not have a significant economic impact on a substantial number of small entities.

Trade Impact Assessment

The rule will not constitute a barrier to international trade, including the export of U.S. airplanes to foreign countries and the import of foreign airplanes into the United States. Instead,

the systems airworthiness standards have been harmonized with those of the Joint Aviation Authorities and will result in cost savings to manufacturers in the United States and in JAA member countries.

Federalism Implications

The regulations adopted herein do not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this final rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

The FAA is revising the airworthiness standards to provide systems and equipment standards for normal, utility, acrobatic, and commuter category airplanes that are substantively the same as the standards that will be proposed for the same category airplanes by the Joint Aviation Authorities in Europe. The revision will reduce the regulatory burden on the United States and European airplane manufacturers by relieving them of the need to show compliance with different standards each time they seek certification approval of an airplane in the United States or in a country that is a member of the JAA.

For the reasons discussed in the preamble, and based on the findings in the Regulatory Evaluation, the FAA has determined that this regulation is significant under Executive Order 12866. In addition, the FAA certifies that this regulation, will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. This final rule is considered significant under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). A regulatory evaluation of the rule has been placed in the docket. A copy may be obtained by contacting the person identified under **FOR FURTHER INFORMATION CONTACT.**

List of Subjects

14 CFR Part 23

Aircraft, Aviation safety, Signs and symbols.

14 CFR Part 91

Aircraft, Aviation safety, Safety.

The Amendment

In consideration of the foregoing, the Federal Aviation Administration amends 14 CFR parts 23 and 91 as follows:

PART 23—AIRWORTHINESS STANDARDS: NORMAL, UTILITY, ACROBATIC, AND COMMUTER CATEGORY AIRPLANES.

1. The authority citation for part 23 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

2. Section 23.677(a) is revised to read as follows:

§ 23.677 Trim systems.

(a) Proper precautions must be taken to prevent inadvertent, improper, or abrupt trim tab operation. There must be means near the trim control to indicate to the pilot the direction of trim control movement relative to airplane motion. In addition, there must be means to indicate to the pilot the position of the trim device with respect to both the range of adjustment and, in the case of lateral and directional trim, the neutral position. This means must be visible to the pilot and must be located and designed to prevent confusion. The pitch trim indicator must be clearly marked with a position or range within which it has been demonstrated that take-off is safe for all center of gravity positions and each flap position approved for takeoff.

* * * * *

3. A new § 23.691 is added to read as follows:

§ 23.691 Artificial stall barrier system.

If the function of an artificial stall barrier, for example, stick pusher, is used to show compliance with § 23.201(c), the system must comply with the following:

(a) With the system adjusted for operation, the plus and minus airspeeds at which downward pitching control will be provided must be established.

(b) Considering the plus and minus airspeed tolerances established by paragraph (a) of this section, an airspeed must be selected for the activation of the downward pitching control that provides a safe margin above any airspeed at which any unsatisfactory stall characteristics occur.

(c) In addition to the stall warning required § 23.07, a warning that is clearly distinguishable to the pilot under all expected flight conditions without requiring the pilot's attention, must be provided for faults that would prevent the system from providing the required pitching motion.

(d) Each system must be designed so that the artificial stall barrier can be quickly and positively disengaged by the pilots to prevent unwanted downward pitching of the airplane by a quick release (emergency) control that meets the requirements of § 23.1329(b).

(e) A preflight check of the complete system must be established and the procedure for this check made available in the Airplane Flight Manual (AFM). Preflight checks that are critical to the safety of the airplane must be included in the limitations section of the AFM.

(f) For those airplanes whose design includes an autopilot system:

(1) A quick release (emergency) control installed in accordance with § 23.1329(b) may be used to meet the requirements of paragraph (d), of this section, and

(2) The pitch servo for that system may be used to provide the stall downward pitching motion.

(g) In showing compliance with § 23.1309, the system must be evaluated to determine the effect that any announced or unannounced failure may have on the continued safe flight and landing of the airplane or the ability of the crew to cope with any adverse conditions that may result from such failures. This evaluation must consider the hazards that would result from the airplane's flight characteristics if the system was not provided, and the hazard that may result from unwanted downward pitching motion, which could result from a failure at airspeeds above the selected stall speed.

4. Section 23.697(c) is added to read as follows:

§ 23.697 Wing flap controls

* * * * *

(c) If compliance with § 23.145(b)(3) necessitates wing flap retraction to positions that are not fully retracted, the wing flap control lever settings corresponding to those positions must be positively located such that a definite change of direction of movement of the lever is necessary to select settings beyond those settings.

5. Section 23.701 is amended by revising paragraphs (a)(1) and (a)(2) to read as follows:

§ 23.701 Flap interconnection.

(a) * * *

(1) Be synchronized by a mechanical interconnection between the movable flap surfaces that is independent of the flap drive system; or by an approved equivalent means; or

(2) Be designed so that the occurrence of any failure of the flap system that would result in an unsafe flight

characteristic of the airplane is extremely improbable; or

* * * * *

6. A new § 23.703 is added to read as follows:

§ 23.703 Takeoff warning system.

For commuter category airplanes, unless it can be shown that a lift or longitudinal trim device that affects the takeoff performance of the aircraft would not give an unsafe takeoff configuration when selection out of an approved takeoff position, a takeoff warning system must be installed and meet the following requirements:

(a) The system must provide to the pilots an aural warning that is automatically activated during the initial portion of the takeoff role if the airplane is in a configuration that would not allow a safe takeoff. The warning must continue until—

(1) The configuration is changed to allow safe takeoff, or

(2) Action is taken by the pilot to abandon the takeoff roll.

(b) The means used to activate the system must function properly for all authorized takeoff power settings and procedures and throughout the ranges of takeoff weights, altitudes, and temperatures for which certification is requested.

§ 23.723 [Amended]

7. Section 23.723(b) is amended by changing the word "reserved" to "reserve".

8. Section 23.729 is amended by revising paragraph (e) and by adding a new paragraph (g) to read as follows:

§ 23.729 Landing gear extension and retraction system.

* * * * *

(e) *Position indicator.* If a retractable landing gear is used, there must be a landing gear position indicator (as well as necessary switches to actuate the indicator) or other means to inform the pilot that each gear is secured in the extended (or retracted) position. If switches are used, they must be located and coupled to the landing gear mechanical system in a manner that prevents an erroneous indication of either "down and locked" if each gear is not in the fully extended position, or "up and locked" if each landing gear is not in the fully retracted position.

* * * * *

(g) *Equipment located in the landing gear bay.* If the landing gear bay is used as the location for equipment other than the landing gear, that equipment must be designed and installed to minimize damage from items such as a tire burst, or rocks, water, and slush that may enter the landing gear bay.

9. Section 23.735 is amended by redesignating paragraph (c) as paragraph (d), by revising the introductory text of paragraph (a), and by adding new paragraphs (c) and (e) to read as follows:

§ 23.735 Brakes.

(a) Brakes must be provided. The landing brake kinetic energy capacity rating of each main wheel brake assembly must not be less than the kinetic energy absorption requirements determined under either of the following methods:

* * * * *

(c) During the landing distance determination required by § 23.75, the pressure on the wheel braking system must not exceed the pressure specified by the brake manufacturer.

* * * * *

(e) In addition, for commuter category airplanes, the rejected takeoff brake kinetic energy capacity rating of each main wheel brake assembly must not be less than the kinetic energy absorption requirements determined under either of the following methods—

(1) The brake kinetic energy absorption requirements must be based on a conservative rational analysis of the sequence of events expected during a rejected takeoff at the design takeoff weight.

(2) Instead of a rational analysis, the kinetic energy absorption requirements for each main wheel brake assembly may be derived from the following formula—

$$KE=0.0443\ WV^2N$$

where,

KE=Kinetic energy per wheel (ft.-lbs.);

W=Design takeoff weight (lbs.);

V=Ground speed, in knots, associated with the maximum value of V_1 selected in accordance with § 23.51(c)(1);

N=Number of main wheels with brakes.

10. A new § 23.745 is added to read as follows:

§ 23.745 Nose/tail wheel steering.

(a) If nose/tail wheel steering is installed, it must be demonstrated that its use does not require exceptional pilot skill during takeoff and landing, in crosswinds, or in the event of an engine failure; or its use must be limited to low speed maneuvering.

(b) Movement of the pilot's steering control must not interfere with the retraction or extension of the landing gear.

11. Section 23.775 is amended by revising paragraphs (a) and (c); by redesignating paragraphs (d) and (e) as paragraphs (e) and (d); by revising the newly designated paragraph (e); and by adding a new paragraph (h) to read as follows:

§ 23.775 Windshields and windows.

(a) The internal panels of windshields and windows must be constructed of a nonsplintering material, such as nonsplintering safety glass.

* * * * *

(c) On pressurized airplanes, if certification for operation up to and including 25,000 feet is requested, an enclosure canopy including a representative part of the installation must be subjected to special tests to account for the combined effects of continuous and cyclic pressurization loadings and flight loads, or compliance with the fail-safe requirements of paragraph (d) of this section must be shown.

* * * * *

(e) The windshield and side windows forward of the pilot's back when the pilot is seated in the normal flight position must have a luminous transmittance value of not less than 70 percent.

* * * * *

(h) In addition, for commuter category airplanes, the following applies:

(1) Windshield panes directly in front of the pilots in the normal conduct of their duties, and the supporting structures for these panes, must withstand, without penetration, the impact of a two-pound bird when the velocity of the airplane (relative to the bird along the airplane's flight path) is equal to the airplane's maximum approach flap speed.

(2) The windshield panels in front of the pilots must be arranged so that, assuming the loss of vision through any one panel, one or more panels remain available for use by a pilot seated at a pilot station to permit continued safe flight and landing.

12. Section 23.783 is amended by revising paragraph (b) and by adding a new paragraph (g) to read as follows:

§ 23.783 Doors.

* * * * *

(b) Passenger doors must not be located with respect to any propeller disk or any other potential hazard so as to endanger persons using the door.

* * * * *

(g) If lavatory doors are installed, they must be designed to preclude an occupant from becoming trapped inside the lavatory. If a locking mechanism is installed, it must be capable of being unlocked from outside of the lavatory.

13. Section 23.785 is amended by adding introductory text and by revising paragraphs (b) and (c) to read as follows:

§ 23.785 Seats, berths, litters, safety belts and shoulder harnesses.

There must be a seat or berth for each occupant that meets the following:

* * * * *

(b) Each forward-facing or aft-facing seat/restraint system in normal, utility, or acrobatic category airplanes must consist of a seat, a safety belt, and a shoulder harness, with a metal-to-metal latching device, that are designed to provide the occupant protection provisions required in § 23.562. Other seat orientations must provide the same level of occupant protection as a forward-facing or aft-facing seat with a safety belt and a shoulder harness, and must provide the protection provisions of § 23.562.

(c) For commuter category airplanes, each seat and the supporting structure must be designed for occupants weighing at least 170 pounds when subjected to the inertia loads resulting from the ultimate static load factors prescribed in § 23.561(b)(2) of this part. Each occupant must be protected from serious head injury when subjected to the inertia loads resulting from these load factors by a safety belt and shoulder harness, with a metal-to-metal latching device, for the front seats and a safety belt, or a safety belt and shoulder harness, with a metal-to-metal latching device, for each seat other than the front seats.

* * * * *

14. Section 23.787 is revised to read as follows:

§ 23.787 Baggage and cargo compartments.

(a) Each baggage and cargo compartment must:

(1) Be designed for its placarded maximum weight of contents and for the critical load distributions at the appropriate maximum load factors corresponding to the flight and ground load conditions of this part.

(2) Have means to prevent the contents of any compartment from becoming a hazard by shifting, and to protect any controls, wiring, lines, equipment or accessories whose damage or failure would affect safe operations.

(3) Have a means to protect occupants from injury by the contents of any compartment, located aft of the occupants and separated by structure, when the ultimate forward inertial load factor is 9g and assuming the maximum allowed baggage or cargo weight for the compartment.

(b) Designs that provide for baggage or cargo to be carried in the same compartment as passengers must have a means to protect the occupants from injury when the baggage or cargo is subjected to the inertial loads resulting from the ultimate static load factors of § 23.561(b)(3), assuming the maximum allowed baggage or cargo weight for the compartment.

(c) For airplanes that are used only for the carriage of cargo, the flightcrew emergency exits must meet the requirements of § 23.807 under any cargo loading conditions.

15. A new § 23.791 is added to read as follows:

§ 23.791 Passenger information signs.

For those airplanes in which the flightcrew members cannot observe the other occupants' seats or where the flightcrew members' compartment is separated from the passenger compartment, there must be at least one illuminated sign (using either letters or symbols) notifying all passengers when seat belts should be fastened. Signs that notify when seat belts should be fastened must:

(a) When illuminated, be legible to each person seated in the passenger compartment under all probable lighting conditions; and

(b) Be installed so that a flightcrew member can, when seated at the flightcrew member's station, turn the illumination on and off.

16. Section 23.807 is amended by revising paragraphs (b) introductory text and (b)(5) and by adding new paragraphs (a)(4) and (b)(6) to read as follows:

§ 23.807 Emergency exits.

(a) * * *

(4) Emergency exits must not be located with respect to any propeller disk or any other potential hazard so as to endanger persons using that exit.

(b) *Type and operation.* Emergency exits must be movable windows, panels, canopies, or external doors, openable from both inside and outside the airplane, that provide a clear and unobstructed opening large enough to admit a 19-by-26-inch ellipse. Auxiliary locking devices used to secure the airplane must be designed to be overridden by the normal internal opening means. The inside handles of emergency exits that open outward must be adequately protected against inadvertent operation. In addition, each emergency exit must—

* * * * *

(5) In the case of acrobatic category airplanes, allow each occupant to abandon the airplane at any speed between V_{SO} and V_D; and

(6) In the case of utility category airplanes certificated for spinning, allow each occupant to abandon the airplane at the highest speed likely to be achieved in the maneuver for which the airplane is certificated.

* * * * *

§ 23.841 [Amended]

17. Section 23.841 is amended in paragraph (a) by removing the number "31,000" and replacing it with "25,000".

18. Section 23.853 is amended by revising the section heading to read as follows:

§ 23.853 Passenger and crew compartment interiors.

* * * * *

19. A new § 23.855 is added to read as follows:

§ 23.855 Cargo and baggage compartment fire protection.

(a) Sources of heat within each cargo and baggage compartment that are capable of igniting the compartment contents must be shielded and insulated to prevent such ignition.

(b) Each cargo and baggage compartment must be constructed of materials that meet the appropriate provisions of § 23.853(d)(3).

(c) In addition, for commuter category airplanes, each cargo and baggage compartment must:

(1) Be located where the presence of a fire would be easily discovered by the pilots when seated at their duty station, or it must be equipped with a smoke or fire detector system to give a warning at the pilots' station, and provide sufficient access to enable a pilot to effectively reach any part of the compartment with the contents of a hand held fire extinguisher, or

(2) Be equipped with a smoke or fire detector system to give a warning at the pilots' station and have ceiling and sidewall liners and floor panels constructed of materials that have been subjected to and meet the 45 degree angle test of Appendix F of this part. The flame may not penetrate (pass through) the material during application of the flame or subsequent to its removal. The average flame time after removal of the flame source may not exceed 15 seconds, and the average glow time may not exceed 10 seconds. The compartment must be constructed to provide fire protection that is not less than that required of its individual panels; or

(3) Be constructed and sealed to contain any fire within the compartment.

20. Section 23.867 is amended by revising the heading that precedes the section and the section heading to read as follows:

Electrical Bonding and Lighting Protection

§ 23.867 Electrical bonding and protection against lightning and static electricity.

* * * * *

21. Section 23.1303 is amended by revising the introductory text; by amending paragraph (d) by inserting the words "reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight and" between the words "For" and "turbine"; by amending paragraph (e) concluding text by adding a line to read, "The lower limit of the warning device must be set to minimize nuisance warning;" at the end of the paragraph and by adding new paragraphs (f) and (g) to read as follows:

§ 23.1303 Flight and navigation instruments.

The following are the minimum required flight and navigation instruments:

* * * * *

(f) When an attitude display is installed, the instrument design must not provide any means, accessible to the flightcrew, of adjusting the relative positions of the attitude reference symbol and the horizon line beyond that necessary for parallax correction.

(g) In addition, for commuter category airplanes:

(1) If airspeed limitations vary with altitude, the airspeed indicator must have a maximum allowable airspeed indicator showing the variation of V_{MO} with altitude.

(2) The altimeter must be a sensitive type.

(3) Having a passenger seating configuration of 10 or more, excluding the pilot's seats and that are approved for IFR operations, a third attitude instrument must be provided that:

(i) Is powered from a source independent of the electrical generating system;

(ii) Continues reliable operation for a minimum of 30 minutes after total failure of the electrical generating system;

(iii) Operates independently of any other attitude indicating system;

(iv) Is operative without selection after total failure of the electrical generating system;

(v) Is located on the instrument panel in a position acceptable to the Administrator that will make it plainly visible to and usable by any pilot at the pilot's station; and

(vi) Is appropriately lighted during all phases of operation.

§ 23.1307 [Amended]

22. Section 23.1307 is amended by removing paragraphs (a) and (b); and by removing the designation from paragraph (c).

23. Section 23.1309(a)(4) is added to read as follows:

§ 23.1309 Equipment, systems, and installations.

(a) * * *

(4) In a commuter category airplane, must be designed to safeguard against hazards to the airplane in the event of their malfunction or failure.

* * * * *

24. Section 23.1311 is revised to read as follows:

§ 23.1311 Electronic display instrument systems.

(a) Electronic display indicators, including those with features that make isolation and independence between powerplant instrument systems impractical, must:

(1) Meet the arrangement and visibility requirements of § 23.1321.

(2) Be easily legible under all lighting conditions encountered in the cockpit, including direct sunlight, considering the expected electronic display brightness level at the end of an electronic display indictor's useful life. Specific limitations on display system useful life must be contained in the Instructions for Continued Airworthiness required by § 23.1529.

(3) Not inhibit the primary display of attitude, airspeed, altitude, or powerplant parameters needed by any pilot to set power within established limitations, in any normal mode of operation.

(4) Not inhibit the primary display of engine parameters needed by any pilot to properly set or monitor powerplant limitations during the engine starting mode of operation.

(5) Have an independent magnetic direction indicator and either an independent secondary mechanical altimeter, airspeed indicator, and attitude instrument or individual electronic display indicators for the altitude, airspeed, and attitude that are independent from the airplane's primary electrical power system. These secondary instruments may be installed in panel positions that are displaced from the primary positions specified by § 23.1321(d), but must be located where they meet the pilot's visibility requirements of § 23.1321(a).

(6) Incorporate sensory cues for the pilot that are equivalent to those in the instrument being replaced by the electronic display indicators.

(7) Incorporate visual displays of instrument markings, required by §§ 23.1541 through 23.1553, or visual displays that alert the pilot to abnormal operational values or approaches to established limitation values, for each parameter required to be displayed by this part.

(b) The electronic display indicators, including their systems and installations, and considering other airplane systems, must be designed so that one display of information essential for continued safe flight and landing will remain available to the crew, without need for immediate action by any pilot for continued safe operation, after any single failure or probable combination of failures.

(c) As used in this section, "instrument" includes devices that are physically contained in one unit, and devices that are composed of two or more physically separate units or components connected together (such as a remote indicating gyroscopic direction indicator that includes a magnetic sensing element, a gyroscopic unit, an amplifier, and an indicator connected together). As used in this section, "primary" display refers to the display of a parameter that is located in the instrument panel such that the pilot looks at it first when wanting to view that parameter.

§ 23.1321 [Amended]

25. Section 23.1321 is amended by removing the words "certificated for flight under instrument flight rules or of more than 6,000 pounds maximum weight" from paragraph (d) introductory text.

26. Section 23.1323 is amended by removing paragraph (d); redesignating paragraph (e) as (d) and paragraph (c) as (e); by removing the words "in flight and" from the first sentence of redesignated paragraph (e); and by adding new paragraphs (c) and (f) to read as follows:

§ 23.1323 Airspeed indicating system.

* * * * *

(c) The design and installation of each airspeed indicating system must provide positive drainage of moisture from the pitot static plumbing.

* * * * *

(f) For commuter category airplanes, where duplicate airspeed indicators are required, their respective pitot tubes must be far enough apart to avoid damage to both tubes in a collision with a bird.

§ 23.1325 [Amended]

27. Section 23.1325 is amended by inserting the words "or icing" between the words "meteorological" and "conditions" in paragraph (g).

28. A new § 23.1326 is added to read as follows:

§ 23.1326 Pitot heat indication systems.

If a flight instrument pitot heating system is installed to meet the requirements specified in § 23.1323(d), an indication system must be provided to indicate to the flight crew when that pitot heating system is not operating. The indication system must comply with the following requirements:

(a) The indication provided must incorporate an amber light that is in clear view of a flightcrew member.

(b) The indication provided must be designed to alert the flight crew if either of the following conditions exist:

(1) The pitot heating system is switched "off."

(2) The pitot heating system is switched "on" and any pitot tube heating element is inoperative.

§ 23.1329 [Amended]

29. Section 23.1329(b) is amended by adding the parenthetical phrase "(both stick controls, if the airplane can be operated from either pilot seat)" between the words, "or on the stick control," and the word "such".

30. Section 23.1337 is amended by revising the section heading, by revising the introductory text of paragraph (b), by redesignating paragraphs (b)(4) and (b)(5) as paragraph (b)(5) and (b)(6), respectively, and by adding a new paragraph (b)(4) to read as follows:

§ 23.1337 Powerplant instruments installation.

* * * * *

(b) *Fuel quantity indication.* There must be a means to indicate to the flightcrew members the quantity of usable fuel in each tank during flight. An indicator calibrated in appropriate units and clearly marked to indicate those units must be used. In addition:

* * * * *

(4) There must be a means to indicate the amount of usable fuel in each tank when the airplane is on the ground (such as by a stick gauge);

* * * * *

31. Section 23.1351 is amended by removing paragraph (b)(4), by redesignating paragraph (b)(5) as (b)(4), by adding a sentence to the end of paragraph (f) that reads, "The external power connection must be located so that its use will not result in a hazard to the airplane or ground personnel", and by revising paragraphs (b)(2), (b)(3), and (c)(3) to read as follows:

§ 23.1351 General.

* * * * *

(b) * * *

(2) Electric power sources must function properly when connected in combination or independently.

(3) No failure or malfunction of any electric power source may impair the ability of any remaining source to supply load circuits essential for safe operation.

* * * * *

(c) * * *

(3) Automatic means must be provided to prevent damage to any generator/alternator and adverse effects on the airplane electrical system due to reverse current. A means must also be provided to disconnect each generator/alternator from the battery and other generators/alternators.

* * * * *

32. Section 23.1353(h) is added to read as follows:

§ 23.1353 Storage battery design and installation.

* * * * *

(h) In the event of a complete loss of the primary electrical power generating system, the battery must be capable of providing at least 30 minutes of electrical power to those loads that are essential to continued safe flight and landing. The 30 minute time period includes the time needed for the pilots to recognize the loss of generated power and take appropriate load shedding action.

33. A new § 23.1359 is added to read as follows:

§ 23.1359 Electrical system fire protection.

(a) Each component of the electrical system must meet the applicable fire protection requirements of §§ 23.863 and 23.1182.

(b) Electrical cables, terminals, and equipment in designated fire zones that are used during emergency procedures must be fire-resistant.

(c) Insulation on electrical wire and electrical cable must be self-extinguishing when tested at an angle of 60 degrees in accordance with the applicable portions of Appendix F of this part, or other approved equivalent methods. The average burn length must not exceed 3 inches (76 mm) and the average flame time after removal of the flame source must not exceed 30 seconds. Drippings from the test specimen must not continue to flame for more than an average of 3 seconds after falling.

§ 23.1361 [Amended]

34. Section 23.1361(c) is amended by removing the last two words "in flight".

35. Section 23.1365 is amended by revising paragraph (b) and by adding new paragraphs (d), (e), and (f) to read as follows:

§ 23.1365 Electrical cables and equipment.

* * * * *

(b) Any equipment that is associated with any electrical cable installation and that would overheat in the event of circuit overload or fault must be flame resistant. That equipment and the electrical cables must not emit dangerous quantities of toxic fumes.

* * * * *

(d) Means of identification must be provided for electrical cables, terminals, and connectors.

(e) Electrical cables must be installed such that the risk of mechanical damage and/or damage cased by fluids vapors, or sources of heat, is minimized.

(f) Where a cable cannot be protected by a circuit protection device or other overload protection, it must not cause a fire hazard under fault conditions.

36. Section 23.1383 is revised to read as follows:

§ 23.1383 Taxi and landing lights.

Each taxi and landing light must be designed and installed so that:

(a) No dangerous glare is visible to the pilots.

(b) The pilot is not seriously affected by halation.

(c) It provides enough light for night operations.

(d) It does not cause a fire hazard in any configuration.

37. Section 23.1401 is amended by revising the introductory text of paragraph (a) to read as follows:

§ 23.1401 Anticollision light system.

(a) *General.* The airplane must have an anticollision light system that:

* * * * *

§ 23.1413 [Amended]

38. Section 23.1413 is removed.

39. Section 23.1431 is amended by adding new paragraphs (c), (d), and (e) to read as follows:

§ 23.1431 Electronic equipment.

* * * * *

(c) For those airplanes required to have more than one flightcrew member, or whose operation will require more than one flightcrew member, the cockpit must be evaluated to determine if the flightcrew members, when seated at their duty station, can converse without difficulty under the actual cockpit noise conditions when the airplane is being

operated. If the airplane design includes provision for the use of communication headsets, the evaluation must also consider conditions where headsets are being used. If the evaluation shows conditions under which it will be difficult to converse, an intercommunication system must be provided.

(d) If installed communication equipment includes transmitter "off-on" switching, that switching means must be designed to return from the "transmit" to the "off" position when it is released and ensure that the transmitter will return to the off (non transmitting) state.

(e) If provisions for the use of communication headsets are provided, it must be demonstrated that the flightcrew members will receive all aural warnings under the actual cockpit noise conditions when the airplane is being operated when any headset is being used.

40. Section 23.1435(c) is revised to read as follows:

§ 23.1435 Hydraulic systems.

* * * * *

(c) *Accumulators.* A hydraulic accumulator or reservoir may be installed on the engine side of any firewall if—

(1) It is an integral part of an engine or propeller system, or

(2) The reservoir is nonpressurized and the total capacity of all such nonpressurized reservoirs is one quart or less.

41. Section 23.1447 is amended by revising paragraphs (d) and (e) and by adding a new paragraph (a)(4) to read as follows:

§ 23.1447 Equipment standards for oxygen dispensing units.

* * * * *

(a) * * *

(4) If radio equipment is installed, the flightcrew oxygen dispensing units must be designed to allow the use of that equipment and to allow communication with any other required crew member while at their assigned duty station.

* * * * *

(d) For a pressurized airplane designed to operate at flight altitudes above 25,000 feet (MSL), the dispensing units must meet the following:

(1) The dispensing units for passengers must be connected to an oxygen supply terminal and be immediately available to each occupant wherever seated.

(2) The dispensing units for crewmembers must be automatically presented to each crewmember before the cabin pressure altitude exceeds 15,000 feet, or the units must be of the quick-donning type, connected to an oxygen supply terminal that is immediately available to crewmembers at their station.

(e) If certification for operation above 30,000 feet is requested, the dispensing units for passengers must be automatically presented to each occupant before the cabin pressure altitude exceeds 15,000 feet.

* * * * *

42. A new § 23.1451 is added to read as follows:

§ 23.1451 Fire protection for oxygen equipment.

Oxygen equipment and lines must:

(a) Not be installed in any designed fire zones.

(b) Be protected from heat that may be generated in, or escape from, any designated fire zone.

(c) Be installed so that escaping oxygen cannot come in contact with and cause ignition of grease, fluid, or vapor accumulations that are present in normal operation or that may result from the failure or malfunction of any other system.

43. A new § 23.1453 is added to read as follows:

§ 23.1453 Protection of oxygen equipment from rupture.

(a) Each element of the oxygen system must have sufficient strength to withstand the maximum pressure and temperature, in combination with any externally applied loads arising from consideration of limit structural loads, that may be acting on that part of the system.

(b) Oxygen pressure sources and the lines between the source and the shutoff means must be:

(1) Protected from unsafe temperatures; and

(2) Located where the probability and hazard of rupture in a crash landing are minimized.

44. Section 23.1461(a) is revised to read as follows:

§ 23.1461 Equipment containing high energy rotors.

(a) Equipment, such as Auxiliary Power Units (APU) and constant speed drive units, containing high energy rotors must meet paragraphs (b), (c), or (d) of this section.

* * * * *

45. Appendix F to part 23 is amended by revising the introductory paragraph, by amending paragraph (c) to change the reference from paragraph (e) to paragraph (g), by amending paragraph (d) to change the reference from paragraph (f) to paragraph (h), by redesignating current paragraph (f) as paragraph (h), and by revising paragraph (b) and adding new paragraphs (f) and (g) to read as follows:

Appendix F To Part 23 Test Procedure

Acceptable test procedure for self-extinguishing materials for showing compliance with §§ 23.853, 23.855 and 23.1359.

* * * * *

(b) *Specimen configuration.* Except as provided for materials used in electrical wire and cable insulation and in small parts, materials must be tested either as a section cut from a fabricated part as installed in the airplane or as a specimen simulating a cut section, such as: a specimen cut from a flat sheet of the material or a model of the fabricated part. The specimen may be cut from any location in a fabricated part; however, fabricated units, such as sandwich panels, may not be separated for a test. The specimen thickness must be no thicker than the minimum thickness to be qualified for use in the airplane, except that: (1) Thick foam parts, such as seat cushions, must be tested in ½ inch thickness; (2) when showing compliance with § 23.853(d)(3)(v) for materials used in small parts that must be tested, the materials must be tested in no more than ⅛ inch thickness; (3) when showing compliance with § 23.1359(c) for materials used in electrical wire and cable insulation, the wire and cable specimens must be the same size as used in the airplane. In the case of fabrics, both the warp and fill direction of the weave must be tested to determine the most critical flammability conditions. When performing the tests prescribed in paragraphs (d) and (e) of this appendix, the specimen must be mounted in a metal frame so that (1) in the vertical tests of paragraph (d) of this appendix, the two long edges and the upper edge are held securely; (2) in the horizontal test of paragraph (e) of this appendix, the two long edges and the edge away from the flame are held securely; (3) the exposed area of the specimen is at least 2 inches wide and 12 inches long, unless the actual size used in the airplane is smaller; and (4) the edge to which the burner flame is applied must not consist of the finished or protected edge of the specimen but must be representative of the actual cross section of the material or part installed in the airplane. When performing the test prescribed in paragraph (f) of this appendix, the specimen must be mounted in metal frame so that all four edges are held securely and the exposed area of the specimen is at least 8 inches by 8 inches.

* * * * *

(f) *Forty-five degree test.* A minimum of three specimens must be tested and the results averaged. The specimens must be supported at an angle of 45 degrees to a horizontal surface. The exposed surface when installed in the aircraft must be face down for the test. The specimens must be exposed to a Bunsen or Tirrill burner with a nominal ⅜ inch I.D. tube adjusted to give a flame of 1½ inches in height. The minimum flame temperature measured by a calibrated thermocouple pyrometer in the center of the

flame must be 1550°F. Suitable precautions must be taken to avoid drafts. The flame must be applied for 30 seconds with one-third contacting the material at the center of the specimen and then removed. Flame time, glow time, and whether the flame penetrates (passes through) the specimen must be recorded.

(g) *Sixty-degree test.* A minimum of three specimens of each wire specification (make and size) must be tested. The specimen of wire or cable (including insulation) must be placed at an angle of 60 degrees with the horizontal in the cabinet specified in paragraph (c) of this appendix, with the cabinet door open during the test or placed within a chamber approximately 2 feet high × 1 foot × 1 foot, open at the top and at one vertical side (front), that allows sufficient flow of air for complete combustion but is free from drafts. The specimen must be parallel to and approximately 6 inches from the front of the chamber. The lower end of the specimen must be held rigidly clamped. The upper end of the specimen must pass over a pulley or rod and must have an appropriate weight attached to it so that the specimen is held tautly throughout the flammability test. The test specimen span between lower clamp and upper pulley or rod must be 24 inches and must be marked 8 inches from the lower end to indicate the central point for flame application. A flame from a Bunsen or Tirrill burner must be applied for 30 seconds at the test mark. The burner must be mounted underneath the test mark on the specimen, perpendicular to the specimen and at an angle of 30 degrees to the vertical plane of the specimen. The burner must have a nominal bore of three-eighths inch, and must be adjusted to provide a three-inch-high flame with an inner cone approximately one-third of the flame height. The minimum temperature of the hottest portion of the flame, as measured with a calibrated thermocouple pyrometer, may not be less than 1,750 °F. The burner must be positioned so that the hottest portion of the flame is applied to the test mark on the wire. Flame time, burn length, and flaming time drippings, if any, must be recorded. The burn length determined in accordance with paragraph (h) of this appendix must be measured to the nearest one-tenth inch. Breaking of the wire specimen is not considered a failure.

* * * * *

PART 91—GENERAL OPERATING AND FLIGHT RULES

46. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 1301(7), 1303, 1344, 1348, 1352 through 1355, 1401, 1421 through 1431, 1471, 1472, 1502, 1510, 1522, and 2121 through 2125; Articles 12, 29, 21, and 32(a) of the Convention on International Civil Aviation (61 Stat. 1180); 42 U.S.C. 4321 *et seq.*; E.O. 11514; 49 U.S.C. 106(g).

47. Section 91.205 is amended by redesignating paragraphs (b)(11) through (b)(16) as paragraphs (b)(12) through (b)(17), respectively, and by adding a new paragraph (b)(11) to read as follows:

§ 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.

* * * * *

(b) * * *

(11) For small civil airplanes certificated after March 11, 1996, in accordance with part 23 of this chapter, an approved aviation red or aviation white anticollision light system. In the event of failure of any light of the anticollision light system, operation of the aircraft may continue to a location where repairs or replacement can be made.

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48. Section 91.209 is revised to read as follows:

§ 91.209 Aircraft lights.

No person may:

(a) During the period from sunset to sunrise (or, in Alaska, during the period a prominent unlighted object cannot be seen from a distance of 3 statute miles or the sun is more than 6 degrees below the horizon)—

(1) Operate an aircraft unless it has lighted position lights;

(2) Park or move an aircraft in, or in dangerous proximity to, a night flight operations area of an airport unless the aircraft—

(i) Is clearly illuminated;

(ii) Has lighted position lights; or

(iii) is in an area that is marked by obstruction lights;

(3) Anchor an aircraft unless the aircraft—

(i) Has lighted anchor lights; or

(ii) Is in an area where anchor lights are not required on vessels; or

(b) Operate an aircraft that is equipped with an anticollision light system, unless it has lighted anticollision lights. However, the anticollision lights need not be lighted when the pilot-in-command determines that, because of operating conditions, it would be in the interest of safety to turn the lights off.

Issued in Washington DC, on January 29, 1996.

David R. Hinson,

Administrator.

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