

federal register

FRIDAY, MARCH 7, 1975

WASHINGTON, D.C.

Volume 40 ■ Number 46

PART II



DEPARTMENT OF TRANSPORTATION

**Federal Aviation
Administration**



AIRWORTHINESS REVIEW PROGRAM

Proposed Standards

**DEPARTMENT OF
TRANSPORTATION**

Federal Aviation Administration

[14 CFR Parts 21, 23, 25, 27, 29, 31, 33,
35, 91, 121, 127, 133, 135]

[Docket No. 14324; Notice No. 75-10]

AIRWORTHINESS REVIEW PROGRAM

Notice Number 2; Miscellaneous Proposals

The Federal Aviation Administration is considering amending Parts 21, 23, 25, 27, 29, 31, 33, 35, 91, 121, 127, 133, and 135 of the Federal Aviation Regulations to update and improve—(1) the aircraft, engine, and propeller certification regulations; (2) the operating regulations containing airworthiness standards; and (3) the related procedural requirements. This is the second in a series of Notices of Proposed Rule Making issued, or to be issued, as a part of the First Biennial Airworthiness Review Program. Notice No. 74-33 (39 FR 36595; October 11, 1974) was the first. Amendments 21-43, 23-16, and 25-37, issued on December 31, 1974 (40 FR 2576; January 14, 1975) pursuant to that notice, incorporated certain form number and clarifying revisions into the Federal Aviation Regulations.

Interested persons, including the general public, manufacturers and users of aircraft and their components, both foreign and domestic, and foreign airworthiness authorities, are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments as they may desire. Comments relating to any significant environmental or economic impact that might result because of the adoption of the proposals contained herein may also be submitted. Comments should identify this regulatory docket or notice number (Docket No. 14324; Notice No. 75-10) and be submitted in duplicate to: Federal Aviation Administration, Office of Chief Counsel, Attention: Rules Docket, AGC-24 800 Independence Avenue, SW, Washington, D.C. 20591. All communications received on or before June 5, 1975, will be considered by the Administrator before taking action on the proposed rules. However, interested persons are urged to submit their comments as early as possible to facilitate rapid resolution of any issues raised. Comments received after the above date will be considered, so far as possible without incurring expense or delay. The proposals contained in this notice may be changed in the light of comments received. All comments submitted will be available in the Rules Docket for examination by interested persons.

On February 12, 1974, the FAA issued an invitation to all interested persons to submit proposals for consideration during the First Biennial Airworthiness Regulations Review (see Notice 74-5, 39 FR 5785, February 15, 1974). In that notice, the FAA announced that it would make available for comment by interested persons a compilation of proposals that were to be given further consideration as possible agenda items for the

First Biennial Airworthiness Review Conference. On May 22, 1974, the FAA issued an announcement of the availability of the Compilation of Proposals containing over 1000 submissions by the FAA and interested persons, and invited all interested persons to submit comments on the proposals it contained (see Notice 74-5A, 39 FR 18662, May 29, 1974).

In response to that invitation for comments, the FAA received over 4900 individual comments contained in 74 submissions. Based on those comments and on the Compilation of Proposals, the FAA prepared a number of working documents, for the Airworthiness Review Conference held in Washington, D.C., on December 2-11, 1974. The FAA distributed those documents to all persons who had participated in the Airworthiness Review Program and to all other interested persons who requested them (see Notice 74-5B, 39 FR 36594, October 11, 1974).

As indicated in Notice 74-5B, not all of the proposals contained in the Compilation were included in the agenda for the conference. A number of proposals were considered at the time to be straightforward, noncontroversial, and adequately justified, so that no useful purpose would have been served by discussing them at the conference. They were identified as "Items for Notice" in the conference workbook titled "Proposals Not in Agenda". This notice deals with that group of proposals. Public comments received in response to Notice 74-5A, and other written comments received after publication of the "Proposals Not in Agenda" workbook, have been considered in preparing this notice.

A number of proposals contained in this notice were not identified as "Items for Notice" in the workbook. They are directly related to the proposals in the workbook and are included for the sake of clarity, consistency, and comprehensiveness. However, in three instances this is not the case. These three are of a minor editorial nature (see the proposals for §§ 23.1309, 25.785, and 25.1309).

Several "Items for Notice" in the "Proposals Not in Agenda" workbook are not included in this notice. Those proposals fell into two general categories—(1) those proposals which needed additional discussion and information before fruitful action could be taken, and (2) those proposals on which no action could be taken during the First Biennial Airworthiness Review.

Appendix I of this notice lists the proposals in the first category. These proposals were added as agenda items and discussed during the Airworthiness Review Conference, were held pending discussion of related agenda items at the conference, or are being held for further study. Action on these proposals will be taken in conjunction with the future notices of proposed rulemaking dealing with proposals discussed at the Airworthiness Review Conference.

Appendix II to this notice lists the proposals in the second category. They were identified as "Items for Notice" in

the "Proposals Not in Agenda" workbook and have been removed from the First Biennial Airworthiness Review. Appendix II briefly explains why.

The FAA believes that the airworthiness standards should, to the extent practical, be consistent throughout the aircraft certification parts (Parts 23, 25, 27, and 29). Certain proposals in this notice are directed at achieving that result; for example, the proposal for § 23.607. Therefore, the FAA has attempted within the time frame of this Airworthiness Review Program, to make consistent and parallel proposals, where appropriate, for each of the certification parts; for example, the proposals for §§ 23.603, 25.603, 27.603, and 29.603 relating to the suitability and durability of materials. On the other hand, the proposal for § 25.841(b)(8) represents an instance where consistent proposals were not made for the parallel sections of Parts 23, 27, and 29. The justification for that proposal applies only to large airplanes with separate cabins having significantly different decompression rates.

To avoid unnecessary repetition, in a number of instances the proposals developed for purposes of consistency are not set forth in their entirety if those proposals are substantively identical to another proposal in this notice. A short-form proposal referring to a proposal that is expressly set forth in this notice is used. Where a short-form proposal is used, however, there may be a need, if the proposal is to be adopted as a final rule, to change paragraph designations, cross references, or aircraft terminology (i.e. "airplane" to "rotorcraft", or vice versa) from that used in the referenced express proposal.

The FAA recognizes that there may exist additional instances in which a proposed rule change prescribed in this notice as expressly applying only to certain parts of the FAR's should more appropriately apply to additional parts as well. Therefore, with respect to each proposal in this notice relating to Parts 23, 25, 27, or 29 of the FAR's for which similar proposals do not exist for all of those parts, comments are solicited from all interested persons with respect to the applicability of that proposal (and its stated explanation) to those parts for which the proposal has not been expressly presented. Such comments received in response to this notice will either be dealt with as a part of the 1974-1975 Airworthiness Review Program or be considered as a part of the next Biennial Airworthiness Review.

For convenience, each proposal in this notice is numbered separately. The FAA requests that interested persons, when submitting comments, refer to proposals by these numbers, or by the sections to which they relate. Each proposal also contains a reference to the Airworthiness Review Program proposal number and section, if any, to which that proposal relates. Comments on this notice should not refer to the Airworthiness Review Program proposal numbers or section numbers without also referring to the corresponding proposal numbers as

set forth in this notice. Each proposal in this notice is followed by an explanation. Some explanations deal with comments received in response to Notice 74-5A.

(Secs. 313(a), 601, 603, 604, 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, 1425); sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)).)

In consideration of the foregoing, it is proposed to amend Parts 21, 23, 25, 27, 29, 31, 33, 35, 91, 121, 127, 133, and 135 of the Federal Aviation Regulations as follows:

PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS

2-1. By revising § 21.33(a) to read as follows:

§ 21.33 Inspection and tests.

(a) Each applicant must allow the Administrator to make any inspection and any flight and ground test necessary to determine compliance with the applicable requirements of the Federal Aviation Regulations. However, unless otherwise authorized by the Administrator—

(1) No aircraft, aircraft engine, propeller or part thereof may be presented to the Administrator for test unless compliance with paragraphs (b) (2) through (b) (4) of this section has been shown for that aircraft, aircraft engine, propeller, or part thereof; and

(2) No change may be made to an aircraft, aircraft engine, propeller or part thereof between the time that compliance with paragraphs (b) (2) through (b) (4) of this section is shown for that aircraft, aircraft engine, propeller, or part thereof and the time that it is presented to the Administrator for test.

Explanation. The purpose of this proposed change is to make the inspection and test requirements compatible for aircraft, aircraft engines, and propellers. Although airworthiness certificates are only issued for aircraft, the FAA believes that prototype inspections on aircraft engines and propellers or parts thereof should be handled in the same manner as on aircraft or parts thereof since they are equally important relative to airworthiness.

Ref. Proposal No. 566; § 21.33(a).

PART 23—AIRWORTHINESS STANDARDS: NORMAL, UTILITY, AND ACROBATIC CATEGORY AIRPLANES

2-2. By revising the first sentence of § 23.23 to read as follows:

§ 23.23 Load distribution limits.

Ranges of weight and centers of gravity within which the airplane may be safely operated must be established and must include the range for lateral centers of gravity if possible loading conditions can result in significant variation of their positions. * * *

Explanation. The present section does not specifically require establishment of the range for lateral centers of gravity. Experience has shown that extreme dis-

location of those centers of gravity can have an adverse effect on handling characteristics. The proposal would require consideration of the significance of variations in the location of lateral centers of gravity that can result from loading conditions, and if possible variations can have significant effects, the establishment of the range of permissible variation.

Ref. Proposal No. 587; § 23.23.

2-3. By revising § 23.141 to read as follows:

§ 23.141 General.

The airplane must meet the requirements of §§ 23.143 through 23.253 at the normally expected operating altitudes without exceptional piloting skill, alertness, or strength.

Explanation. Certain sections in the flight characteristics requirements require that prescribed controllability and maneuverability be accomplished "without exceptional piloting skill, alertness, or strength." The FAA believes that this requirement should be applied to all flight characteristics. The proposal would apply the requirement to §§ 23.143 through 23.253. While the FAA recognizes that quantification of these requirements may be desirable, it is not feasible to accomplish that objective within the framework of the 1974-75 Airworthiness Review.

Separate proposals to delete this phrase in affected sections are included in this Notice.

Ref. Proposal Nos. 602, 614; §§ 23.141, 23.230.

§ 23.143 [Amended]

2-4. By amending § 23.143(b) by striking the words "without exceptional piloting skill, alertness, or strength, and".

Explanation. See proposal for § 23.141.

Ref. Proposal Nos. 602, 603; §§ 23.141, 23.143(b).

2-5. By amending § 23.145(c) by striking the words "without exceptional piloting skill", and the commas preceding and following those words, and by revising § 23.145(e) to read as follows:

§ 23.145 Longitudinal control.

(e) It must be possible to establish a zero rate of descent at an attitude suitable for a controlled landing without exceeding the operational and structural limitations of the airplane—

(1) For single engine airplanes, by using the normal flight and power controls except the primary longitudinal control system; and

(2) For multiengine airplanes—

(i) By using the normal flight and power controls except the primary longitudinal control system; and

(ii) By using the normal flight and power controls except the primary directional control system.

However, for multiengine airplanes, if a single failure of any one connecting or transmitting link would affect both the

longitudinal and directional primary control systems, compliance with subparagraph (2) of this paragraph must be shown by using the normal flight and power controls except the primary longitudinal and directional control systems.

Explanation. Current § 23.145(e) is not compatible with § 23.677(b) which requires that longitudinal trimming devices in single engine airplanes and both longitudinal and directional trimming devices in multiengine airplanes be designed to provide adequate control for safe flight and landing after failure of any one connecting or transmitting element in the primary flight control system. The proposal would revise § 23.145(e) to require flight demonstration of that capability. The FAA believes the requirement relating to directional control is essential to safe design of multiengine airplanes. Also, see the proposal for § 23.141.

Ref. Proposal Nos. 602, 604, 605; §§ 23.141, 23.145(c)

2-6. By revising the second sentence of § 23.149(b) to read as follows:

§ 23.149 Minimum control speed.

(b) * * * During recovery the airplane may not assume any dangerous attitude and it must be possible to prevent a heading change of more than 20 degrees.

Explanation. See proposal for § 23.141.

Ref. Proposal No. 602; § 23.141.

2-7. By revising § 23.175(c) (3) and (4) to read as follows:

§ 23.175 Demonstration of static longitudinal stability.

(c) * * *

(3) 75 percent of maximum continuous power for reciprocating engines, or for turbine engines, the maximum cruising power selected by the applicant as an operating limitation, except that the power need not exceed that required for level flight at V_{LE}; and

(4) The airplane trimmed for level flight at the power selected in accordance with subparagraph (3) of this paragraph.

Explanation. The present rule does not adequately define the trim speed at which compliance is to be demonstrated. The proposal provides for demonstration at a trim speed based on a realistic power setting.

Ref. Proposal No. 609; § 23.175(e).

§ 23.253 [Amended]

2-8. By deleting § 23.253(b) (1), and by redesignating §§ 23.253(b) (2) and (3) as § 23.253(b) (1) and (2), respectively.

Explanation. See the proposal for § 23.141.

Ref. Proposal Nos. 602, 614; §§ 23.141, 23.230.

2-9. By revising the section heading of § 23.397 and the lead-in, table and footnotes 2 and 4 of § 23.397(b) and adding footnote 5 to read as follows:

§ 23.397 Limit control forces and torques.

(b) The limit pilot forces and torques are as follows:

| Control | Maximum forces or torques for design weight, weight equal to or less than 5,000 pounds ¹ | Minimum forces or torques ² |
|----------------------------------|---|--|
| Aileron: | | |
| Stick | 67 lbs. | 40 lbs. |
| Wheel ³ | 50 D in.-lbs. ⁴ | 40 D in.-lbs. ⁴ |
| Elevator: | | |
| Stick | 167 lbs. | 100 lbs. |
| Wheel (symmetrical) ⁵ | 200 lbs. | 100 lbs. |
| Wheel (unsymmetrical) | | 100 lbs. |
| Rudder | 200 lbs. | 130 lbs. |

¹ If the design of any individual set of control systems or surfaces makes these specified minimum forces or torques inapplicable, values corresponding to the present hinge moments obtained under sec. 23.416, but not less than 0.6 of the specified minimum forces or torques, may be used.

² D = wheel diameter (inches).
³ The unsymmetrical force must be applied at one of the normal handgrip points on the control wheel.

Explanation. The proposal would update the rule to require substantiation of elevator control wheels for unsymmetrical forces that are often applied to the wheel when it is operated with one hand. In addition, it is proposed to express the requirement applicable to aileron wheel controls in terms of torque, as is done in FAR 25, and to revise footnotes 2 and 4 and the section and table headings to be consistent with this revision.

Ref. Proposal No. 618; § 23.397(b).

2-10. By adding a new § 23.479(d) to read as follows:

§ 23.479 Level landing conditions.

(d) For airplanes with tip tanks or large overhung masses (such as turbo-propeller or jet engines) supported by the wing, the tip tanks and the structure supporting the tanks or overhung masses must be designed for the effects of dynamic responses under the level landing conditions of either paragraph (a) (1) or (a) (2) (ii) of this section. In evaluating the effects of dynamic response, an airplane lift equal to the weight of the airplane may be assumed.

Explanation. Section 23.479 does not specifically require that dynamic response be taken into account as an effect on landing conditions. The FAA believes because of current designs there is a need to require the evaluation of the dynamic response of overhung masses and tip tank installations for level landing conditions. The proposal would require that the supporting structure, including the wing as necessary, and in the case of tip tanks, the tank itself be designed for the effects of dynamic response.

Ref. Proposal No. 619; § 23.479(d).

2-11. By revising the lead in of § 23.603 (a) to read as follows:

§ 23.603 Materials and workmanship.

(a) The suitability and durability of materials used for parts, the failure of which could adversely affect safety, must—

Explanation. See the proposal for § 25.603.

Ref. Proposal No. 212; § 25.603.

2-12. By revising § 23.607 to read as follows:

§ 23.607 Self-locking nuts.

No self-locking nut may be used on any bolt subject to rotation in operation unless a nonfriction locking device is used in addition to the self-locking device.

Explanation. The proposal would make this rule the same as the Part 25 requirement by relaxing the present prohibition against the use of self-locking nuts on bolts that are subject to any rotation in operation if a nonfriction locking device is used in addition to the self-locking device.

Ref. Proposal No. 620; § 23.607.

2-13. By revising § 23.675 to read as follows:

§ 23.675 Stops.

(a) Each control system must have stops that positively limit the range of motion of each movable aerodynamic surface controlled by the system.

(b) Each stop must be located so that wear, slackness, or takeup adjustments will not adversely affect the control characteristics of the airplane because of a change in the range of surface travel.

(c) Each stop must be able to withstand any loads corresponding to the design conditions for the control system.

Explanation. The present rule requires stops to limit the motion of the pilot's controls. The intent of the rule is to require stops that would limit the motion of surfaces, and the proposal would change the rule to accomplish that intent. In addition, the proposal would change the rule to require stops on all aerodynamic surfaces because the FAA has determined from service experience that safety would be enhanced if the travel of all such surfaces is positively limited. The proposal would also clarify the requirement of paragraph (b) by stating a more objective standard than that contained in the present paragraph (b). Paragraph (c) would also be clarified to assure consideration of any load corresponding to the design conditions of the system.

Ref. Proposal No. 624; § 23.675.

§ 23.685 [Amended]

2-14. By amending § 23.685(a) by deleting the word "or" after "passengers", and by striking the period after the word "objects" and inserting a comma in its place, followed by the words "or the freezing of moisture."

Explanation. See the proposal for § 25.685.

Ref. Proposal No. 225; § 25.685.

2-15. By adding a new § 23.733(c) to read as follows:

§ 23.733 Tires.

(c) Each tire installed on a retractable landing gear system must, at the maximum size of the tire type expected in service, have a clearance to surrounding structure and systems that is adequate to prevent contact between the tire and any part of the structure or systems.

Explanation. The proposed rule would require that the selection of tires for installation on retractable landing gear mechanisms take into account the tire production tolerances and size increases that would be expected to result from service. The FAA believes compliance with the proposed rule could prevent accidents that might result from jamming of landing gear mechanisms by oversize tires.

Ref. Proposal No. 628; § 23.733(c).

2-16. By adding a new § 23.787(f) to read as follows:

§ 23.787 Cargo compartments.

(f) Cargo compartment lamps must be installed so as to prevent contact between lamp bulbs and cargo.

Explanation. Continued direct contact between a hot bulb and cargo could cause a fire. A protective metal screen on the lamp could prevent such contact and also protect the bulb to some extent from damage. Hazardous damage to a lamp that could be caused by shifting cargo is required to be accounted for under present paragraph (b) of the rule.

Ref. Proposal No. 96; § 23.787(f).

§ 23.841 [Amended]

2-17. By amending § 23.841(b) (1) in a manner substantively identical to that proposed for § 25.841(b) (1), and by revising § 23.841(b) (5) and (6) to read as follows:

(b) * * *

(5) Instruments to indicate to the pilot the pressure differential, the cabin pressure altitude, and the rate of change of cabin pressure altitude.

(6) Warning indication at the pilot station to indicate when the safe or preset pressure differential is exceeded, and when a cabin pressure altitude of 10,000 feet is exceeded.

Explanation. This proposal would make clear that the rule applies to cabin pressure and the rate of change of cabin pressure. The proposal would also conform the rule to current practice, which is to provide a warning when the cabin pressure altitude exceeds 10,000 feet. Also see the proposal for § 25.841.

Ref. Proposal No. 97; § 23.841(e). (Note section change. FAR's published by FAA erroneously carry paragraphs

(c), (d), (e), (f), (g), and (h), which were integrated into (b) by Amdt. 23-14.)

2-18. By deleting § 23.853(b) and marking it "[Reserved]" and by revising § 23.853(c) to read as follows:

§ 23.853 **Compartment interiors.**

(c) If smoking is to be prohibited, there must be a placard so stating, and if smoking is to be allowed—

(1) There must be an adequate number of self-contained, removable ash trays; and

(2) Where the crew compartment is separated from the passenger compartment, there must be at least one sign (using either letters or symbols) notifying all passengers when smoking is prohibited. Signs which notify when smoking is prohibited must—

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

(ii) When illuminated internally, be so constructed that the crew can turn them on and off; and

Explanation. The purpose of this proposal and the similar proposals to §§ 25.853(c), 27.853(c) and 29.853(c) is to update and make consistent the certification requirements necessary to permit smoking in aircraft.

Ref. Proposal No. 911; § 29.853.

2-19. By adding a new § 23.903(b) to read as follows:

§ 23.903 **Engines.**

(b) *Turbine engine installation.* For turbine engine installations, the powerplant systems associated with engine control devices, systems, and instrumentation must be designed to give reasonable assurance that those engine operating limitations that adversely affect turbine rotor structural integrity will not be exceeded in service.

Explanation. The proposal is needed because of the increasing number of new turbine powered airplanes being certificated under Part 23, and it would provide general design requirements relating to engine operating limitations.

The proposal is consistent with § 25.903(d)(2); however, it is not proposed that a provision identical to that contained in § 25.903(d)(1) be added to Part 23 since the FAA is not presently aware of sufficient information to warrant the imposition of such a requirement for Part 23 airplanes.

Ref. Proposal No. 641; § 23.903.

§ 23.933 [Amended]

2-20. By amending § 23.933(b) in a manner substantively identical to that proposed for § 25.933(b).

§ 23.941 [New]

2-21. By adding a new § 23.941 that would be substantively identical to the proposed new § 25.941.

2-22. By redesignating the lead-in of § 23.971 and §§ 23.971(a) and 23.971(b) as § 23.971(a) and §§ 23.971(a)(1), and 23.971(a)(2), respectively, and by adding a new § 23.971(b) to read as follows:

§ 23.971 **Fuel tank sump.**

(b) Each sump, sediment bowl, and sediment chamber drain required by paragraph (a) of this section must comply with the drain provisions of § 23.999(b)(1), (2), and (3) of this part.

Explanation. The explanation for the fuel system drain proposal for § 23.999 is equally applicable to sump, sediment bowl, and sediment chamber drains.

Ref. Proposal No. 643; § 23.971.

2-23. By revising § 23.977 to read as follows:

§ 23.977 **Fuel tank outlet.**

(a) There must be a fuel strainer for the fuel tank outlet or for the booster pump. This strainer must—

(1) For reciprocating engine powered airplanes, have 8 to 16 meshes per inch; and

(2) For turbine engine powered airplanes, prevent the passage of any object that could restrict fuel flow or damage any fuel system component.

(b) The clear area of each fuel tank outlet strainer must be at least five times the area of the outlet line.

(c) The diameter of each strainer must be at least that of the fuel tank outlet.

(d) Each finger strainer must be accessible for inspection and cleaning.

Explanation. The proposal would revise § 23.977 to—

(1) Provide a more satisfactory provision relating to turbine engine fuel tank outlet strainers;

(2) Provide standards relating to strainers of differing configurations; and

(3) Provide for the utilization of submerged booster pumps which are currently being installed in larger Part 23 airplanes. The proposal would continue to contain standards applicable to airplanes not having submerged booster pumps. It should be noted that the proposal is identical to § 25.977, as amended by Amendment 25-36. It should also be noted that § 23.951(c), as added by Amendment 23-15, specifies icing requirements relating to turbine engine fuel systems.

Ref. Proposal No. 646; § 23.977.

§ 23.979 [Amended]

2-24. By adding a new § 23.979(e) that would be substantively identical to the proposed new § 25.979(e).

2-25. By revising § 23.995(d) to read as follows:

§ 23.995 **Fuel valves and controls.**

(d) Each valve and fuel system control must be installed so that gravity and vibration will not affect the selected position.

Explanation. The present requirement dictates a design that may not be the

best for all aircraft or conditions. The proposal would require that each valve and fuel system control be designed so that gravity and vibration will have no effect on the selected valve or control position instead of tending to move the control or valve to the open or "on" position as is currently required. In certain situations the closed or off position could be the preferred control or valve position.

Ref. Proposal No. 107; § 23.995(d).

2-26. By revising § 23.999(b) to read as follows:

§ 23.999 **Fuel system drains.**

(b) Each drain required by paragraph (a) of this section and § 23.971 must—

(1) Discharge clear of all parts of the airplane;

(2) Have manual or automatic means for positive locking in the closed position; and

(3) Have a quick actuation drain valve that is readily accessible and which can be easily opened and closed. Each such valve must be either located or protected so that it will not be damaged in the event of a landing with landing gear retracted.

Explanation. Current §§ 23.999 and 25.999 do not require quick actuation type drain valves and do not provide adequate standards for such valves, if installed. The absence of a quick actuation type drain valve has been suggested as a contributing factor in accidents caused by water contamination of fuel. The proposal would require the installation of quick actuation type drain valves and would provide standards relating to such installations.

Ref. Proposal Nos. 652, 643; §§ 23-999(b), 23.971.

2-27. By adding a new § 23.1093(c) to read as follows:

§ 23.1093 **Induction system icing protection.**

(c) For airplanes with engines having superchargers to pressurize the air before it enters the carburetor, the heat rise in the air cause by that supercharging at any altitude may be utilized in determining compliance with paragraph (a) of this section provided that the heat rise utilized is that which will be available, automatically, for the applicable altitude and operating condition because of supercharging.

Explanation. Supercharging warms air during compression. Enough heat will result at some degree of supercharging to prevent carburetor icing irrespective of ambient conditions. The proposal would permit the consideration of automatic supercharging caused heat rise in determining whether additional means to eliminate induction system icing is needed.

Ref. Proposal No. 659; § 23.1093(a)(6).

2-28. By revising § 23.1111(c) to read as follows:

§ 23.1111 Turbine engine bleed air system.

(c) No failure of the engine lubrication system may result in hazardous contamination of cabin air systems.

Explanation. The proposal contains a realistic design requirement relating to contamination of cabin air systems due to the failure of the engine lubrication system. Under the proposal, the determination of what would amount to hazardous contamination would depend on a case by case analysis of numerous factors including but not limited to the type of engine lubricants, the engine operating temperature, the cabin volume and the cabin ventilation system. The word "failure" has not been qualified by the term "reasonable and foreseeable" because that term is insufficiently definitive.

Ref. Proposal No. 71; § 23.1111(c).

2-29. By adding a new lead-in to § 23.1125 and by revising § 23.1125(a) (3) to read as follows:

§ 23.1125 Exhaust heat exchangers.

For reciprocating engine powered airplanes the following apply:

- (a)
- (3) Each exchanger must have cooling provisions wherever it is subject to contact with exhaust gases. Those cooling provisions must be designed and installed so that it is not possible to use a heat exchanger unless its cooling provisions are in operation.

Explanation. Current § 23.1125(a) (3) requires that heat exchangers be ventilated where they are subject to contact with exhaust gases. The proposal would replace the restrictive requirement for ventilation with the more general requirement for cooling provisions. Other changes are proposed and are explained under proposed § 25.1125(a) (3).

Ref. Proposal No. 288; § 25.1125(a).

2-3. By revising the title of § 23.1143 and by adding a new § 23.1143(e) to read as follows:

§ 23.1143 Engine controls.

(e) If a power or thrust control incorporates a fuel shutoff feature, the control must have a means to prevent the inadvertent movement of the control into the shutoff position. The means must have a positive lock or stop at the idle position and must require a separate and distinct operation to place the control in the shutoff position.

Explanation. Many turbine powered aircraft have power and thrust controls which also serve as fuel cutoffs at the fuel control unit. Several of these controls are arranged so that movement of them aft of the idle position would place the control in the cutoff position. The proposal would require that a means be employed to prevent the control from being inadvertently moved into the cutoff position.

Ref. Proposal No. 663; § 23.1143.

2-31. By adding a new § 23.1165(e) to read as follows:

§ 23.1165 Engine ignition systems.

(e) Each ignition system must be independent of any electrical circuit that is not used for assisting, controlling, or analyzing the operation of that system.

Explanation. Many airplanes have engine ignition systems tied in with other electrical systems. In such cases, a malfunction in another electrical system could affect the engine ignition system and might result in engine problems. The FAA believes that it is appropriate to require that the ignition system be kept independent of other electrical systems unless they are being used to assist, control, or analyze the ignition system.

Ref. Proposal No. 665; § 23.1165.

2-32. By adding new § 23.1303 (d) and (e) to read as follows:

§ 23.1303 Flight and navigation instruments.

(d) A free air temperature indicator for turbine engine powered airplanes.

(e) A speed warning device for—
(1) Turbine engine powered airplanes; and

(2) Other airplanes for which V_{MO}/M_{MO} and V_D/M_D are established under §§ 23.335(b) (4) and 23.1505(c) if V_{MO}/M_{MO} is greater than $0.8 V_D/M_D$.

The speed warning device must give effective aural warning (differing distinctively from aural warnings used for other purposes) to the pilots whenever the speed exceeds V_{MO} plus 6 knots or $M_{MO} + 0.01$. The upper limit of the production tolerance for the warning device may not exceed the prescribed warning speed.

Explanation. The proposal would update § 23.1303 to require a free air temperature indicator for turbine engine powered airplanes. The proposal would also update the section to provide for a speed warning device for turbine engine powered airplanes and certain other airplanes for which V_{MO}/M_{MO} and V_D/M_D have been established. The speed warning device proposal is similar to the requirement contained in Part 25 to the extent practicable for Part 23 airplanes. It should be noted that under the proposal turbopropeller powered airplanes would be required to have installed both a free air temperature indicator and speed warning device since service experience does not indicate any need to differentiate those airplanes from other turbine engine powered airplanes with respect to the need for such equipment. The FAA will continue to assess the need to require the installation of additional flight and navigation equipment for aircraft certificated under Part 23.

Ref. Proposal No. 673; § 23.1303.

§ 23.1309 [Amended]

2-33. By inserting a comma between the words "Equipment" and "systems," and between the words "systems" and "and", in the title of § 23.1309.

Explanation. The proposal is editorial in nature.

Ref. None.

2-34. By adding a new § 23.1322 to read as follows:

§ 23.1322 Warning, caution, and advisory lights.

If warning, caution, or advisory lights are installed, they must, unless otherwise approved by the Administrator, be—

(a) Red, for warning lights (lights indicating a hazard which may require immediate corrective action);

(b) Amber, for caution lights (lights indicating the possible need for future corrective action);

(c) Green, for safe operation lights;

(d) Blue, for position indication, agreement, and correct response lights; and

(e) Any other color, including white, for lights not described in paragraphs (a) through (d) of this section, provided the color differs sufficiently from the colors prescribed in paragraphs (a) through (d) of this section to avoid possible confusion.

Explanation. The use of lights as sources of information in airplanes is common practice. The FAA considers that standardization of the colors of these lights is an appropriate extension of cockpit standardization. Parts 27 and 29 currently contain color standards and it is proposed that further changes in those standards be made. One of these changes, of a clarifying nature, that should be noted is in the description of warning lights as contained in proposed paragraph (a). This proposal is one of four identical proposals affecting §§ 23.1322, 25.1322, 27.1322, and 29.1322. These proposals provide standardized light requirements and also provide for approved variance from the colors specified for lights such as marker beacon lights, if found to be appropriate. It should be noted that the proposals also specify blue as the color for position indication, agreement, and correct response lights, blue being a color currently used successfully in service.

Ref. Proposal No. 682; § 23.1322.

2-35. By adding a new § 23.135(c) to read as follows:

§ 23.1325 Static pressure systems.

(c) If the static pressure system incorporates both a primary and an alternate static pressure source, the means for selecting one or the other source must be designed so that—

(1) When either source is selected, the other is blocked off; and

(2) Both sources cannot be blocked off simultaneously.

Explanation. The proposal would provide more complete duality of static pressure sources if both primary and alternate sources are installed. Service experience, however, indicates no need for an additional requirement that the selector be secured in the primary source position.

Ref. Proposal No. 684; § 23.1325.

2-36. By deleting the semicolon and the word "and" from § 23.1331(b) (1) and inserting a period, and by revising the lead in sentence of § 23.1331(b) to read as follows:

§ 23.1331 Instruments using a power supply.

(b) In addition, for multiengine airplane flight and navigation instruments, required by this chapter, that use a power supply, the following apply:

Explanation. The proposal would make it clear that the provisions of § 23.1331 (b) are in addition to those in § 23.1331 (a) and that paragraph (b) applies only to flight and navigation instruments required by the FAR's and only to those instruments that use power supplies.

Ref. Proposal No. 689; § 23.1331.

§ 23.1335 [Deleted]

2-37. By deleting § 23.1335.

Explanation. The utilization of flight director systems in modern aircraft makes the language of §§ 23.1335 (a) and (b) archaic in concept and not meaningful as an airworthiness requirement. With the exception of Part 23, the FAR's do not refer to flight director instruments per se. The proposal would delete § 23.1335, but the general equipment requirements of Part 23 would continue to apply to flight director systems, if installed.

Ref. Proposal No. 690; § 23.1335 (a) (b).

2-38. By deleting the word "and" following the semicolon in § 23.1351(c) (3); by adding a semicolon and the word "and" at the end of § 23.1351(c) (4); and by adding a new § 23.1351(c) (5) to read as follows:

§ 23.1351 General.

(c) * * *

(5) Each generator must have an overvoltage control designed and installed to prevent damage to the electrical system, or to equipment supplied by the electrical system, that could result if that generator were to develop an overvoltage condition.

Explanation. Complete electrical system failures on both single and twin engine aircraft continue to occur. The electrical failure that causes this problem is often the loss of voltage control in the voltage regulator. This usually results in a bus voltage well above the capabilities of the electrical equipment connected to the bus. This overvoltage condition frequently destroys electronic equipment and boils the electrolyte in the battery. The proposal is only directed at this overvoltage problem and therefore differs from § 25.1351(b). The proposal would not require a specific method of overvoltage control.

Ref. Proposal No. 692; § 23.1351(c) (5).

2-39. By adding a new § 23.1353(f) to read as follows:

§ 23.1353 Storage battery design and installation.

(f) Nickel cadmium battery installations capable of being used to start an engine or auxiliary power unit must have—

(1) A system to control the charging rate of the battery automatically so as to prevent battery overheating;

(2) A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or

(3) A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of a battery failure.

If compliance is shown with subparagraph (2) or (3) of this paragraph the operating procedures for disconnecting the battery from its charging source must be established and included in the Airplane Flight Manual.

Explanation. The proposal conforms to paragraph (b) of AD 72-19-4, which applies to all nickel-cadmium batteries that are capable of being used to start an aircraft engine or auxiliary power unit.

Ref. Proposal No. 693; § 23.1353 (f).

§ 23.1385 [Amended]

2-40. By amending § 23.1385 in a manner substantively identical to that proposed for § 25.1385.

§ 23.1411 [Amended]

2-41. By amending § 23.1411 in a manner substantively identical to that proposed for § 27.1411.

§ 23.1549 [Amended]

2-42. By amending § 23.1549 in a manner substantively identical to that proposed for § 25.1549.

§ 23.1555 [Amended]

2-43. By amending § 23.1555(d) in a manner substantively identical to that proposed for § 29.1555(c), by striking the word "and" from § 23.1555(c) (2), redesignating § 23.1555(c) (3) as (c) (4), and adding a new (c) (3) to read as follows:

(c) * * *

(3) The conditions under which the full amount of usable fuel in any restricted usage fuel tank can safely be used must be on a placard adjacent to the selector valve for that tank and in the Airplane Flight Manual; and

Explanation. Current § 23.1587(a) (2) provides that information concerning the safe use of all usable fuel in a restricted use fuel tank need not be on a placard if it is in the Airplane Flight Manual. The FAA believes this information should be on appropriately located placards in all cases, as well as in the Airplane Flight Manual. Also, see the proposal for § 29.1555.

Ref. Proposal Nos. 709, 716; §§ 23.1555 (c) (3), 23.1587(a) (2).

§ 23.1557 [Amended]

2-44. By amending § 23.1557(c) in a manner substantively identical to that proposed for § 25.1557(b), and by adding a new § 23.1557(e) to read as follows:

(e) The system voltage of each direct current installation must be clearly marked adjacent to its external power connection.

Explanation. With similar models of aircraft being offered with either a 12 or 24 volt D.C. electrical system, it is possible for external power units of incorrect voltage to be connected to those systems with resultant damage to aircraft electronic equipment, particularly solid state equipment. The proposal would require that the system D.C. voltage be marked adjacent to the external power connection.

Ref. Proposal No. 130; § 23.1557.

2-45. By revising § 23.1581(b) and by adding a new § 23.1581(d) to read as follows:

§ 23.1581 General.

(b) *Approved information.*

(1) Each page of the Airplane Flight Manual that contains operating limitations prescribed in § 23.1583 and in paragraph (c) of this section must be limited to such information, and must be approved, identified, and clearly distinguished from each other page in the Airplane Flight Manual.

(2) The information, other than operating limitations prescribed in §§ 23.1585 through 23.1589 and in paragraph (c) of this section, must be determined in accordance with the applicable requirements of this part and must—

(i) Be presented in its entirety in a manner acceptable to the Administrator; or

(ii) Each page of the Airplane Flight Manual that contains this information must be approved.

(3) Each page of the Airplane Flight Manual containing information prescribed in this section must be of a type that is not easily erased, disfigured, or misplaced, and is capable of being inserted in a manual provided by the applicant, or in a folder, or in any other permanent binder.

(d) *Table of contents.* Each Airplane Flight Manual must include a table of contents if the complexity of the manual indicates a need for it.

Explanation. The proposed rule would permit the information in the Airplane Flight Manual to be organized in a form suitable for the pilots' needs. Under the proposal, only the pages containing the operating limitations for the airplane would have to be approved, identified, and distinguished from other pages in the Manual. The operating procedures, performance, and weight-and-balance sections of the Manual could, at the option of the applicant, be presented in a manner acceptable to the Administrator if the required information is determined

in accordance with the applicable requirements. Under this option, the required information (other than operating limitations) would be reviewed by FAA but would not be identified as FAA-approved on the individual pages and would not have to be segregated from additional information supplied by the manufacturer.

In addition, the FAA believes that an Airplane Flight Manual should have a table of contents as needed to prevent undue delay in finding information. The proposed rule would require at least a determination that there exists no need for a table of contents. The FAA recognizes that particular Airplane Flight Manuals may be of such limited scope that there is no need for a table of contents.

Ref. Proposal Nos. 131, 712; §§ 23.1581(b), 23.1581(d).

§ 23.1587 [Amended]

2-46. By striking the second sentence of § 23.1587(a) (2).

Explanation. See the proposal for § 23.1555.

Ref. Proposal Nos. 709, 716; §§ 23.1555(c) (3), 23.1587(a) (2).

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

§§ 25.45-25.75 [Deleted]

2-47. By deleting the center heading, "PERFORMANCE: RECIPROCATING ENGINE POWERED AIRPLANES," following § 25.33, by deleting § 25.45 through and including 25.75, and by deleting the center heading, "PERFORMANCE: TURBINE ENGINE POWERED AIRPLANES," following § 25.75 and inserting in its place the center heading, "PERFORMANCE".

Explanation. Part 25 specifies different performance requirements for reciprocating engine and turbine engine powered airplanes. The performance requirements for reciprocating engine powered airplanes reflect an empirical approach based on rates of climb, while those applicable to turbine engine powered airplanes reflect a modern version based on gradients of climb. The performance requirements for reciprocating engine powered airplanes are not as broad and objective as those for turbine powered airplanes and lack the flexibility to apply to varied situations. Accordingly, to ensure a uniform level of safety for future certificated transport category airplanes, the reciprocating engine performance requirements would be deleted. However, the humidity correction factors for reciprocating engine powered airplanes would be retained and transferred to § 25.101(b).

Ref. Proposal No. 1021; §§ 25.45 through 25.75.

2-48. By striking the words "turbine powered" from § 25.101(a), and by revising § 25.101(b) to read as follows:

§ 25.101 General.

(b) The performance, as affected by engine power or thrust, must be based on the following relative humidities:

(1) For turbine engine powered airplanes, a relative humidity of—

(i) 80 percent, at and below standard temperatures; and

(ii) 34 percent, at and above standard temperatures plus 50 degrees F.

Between these two temperatures, the relative humidity must vary linearly.

(2) For reciprocating engine powered airplanes, a relative humidity of 80 percent. Engine power corrections for vapor pressure must be made in accordance with the following table:

| Altitude H (ft.) | Vapor pressure e (In. Hg.) | Specific hu- midity w (lb. mois- ture per lb. dry air) | Density ratio ρ $\rho = 0.0023769$ |
|---------------------|----------------------------------|--|---|
| 0 | 0.408 | 0.00949 | 0.99508 |
| 1,000 | .354 | .00778 | .96772 |
| 2,000 | .311 | .00708 | .93985 |
| 3,000 | .272 | .00638 | .91178 |
| 4,000 | .238 | .00578 | .88514 |
| 5,000 | .207 | .00523 | .85910 |
| 6,000 | .1805 | .00472 | .83361 |
| 7,000 | .1566 | .00425 | .80870 |
| 8,000 | .1356 | .00382 | .78434 |
| 9,000 | .1172 | .00343 | .76053 |
| 10,000 | .1010 | .00307 | .73722 |
| 15,000 | .0463 | .001710 | .62668 |
| 20,000 | .01978 | .000896 | .53263 |
| 25,000 | .00778 | .000436 | .44906 |

Explanation. See the explanation for the proposed deletion of §§ 25.45 through 25.75. If the proposal to delete § 25.45 is adopted, the humidity correction factors for reciprocating engine powered airplanes prescribed in that section should be transferred to § 25.101. The proposed revision to § 25.101(b) would accomplish this.

Ref. Proposal No. 1021; §§ 25.45 through 25.75.

2-49. By revising § 25.105(c) to read as follows:

§ 25.105 Takeoff.

(c) The takeoff data must be based on the following:

(1) For landplanes and amphibians—
(i) A smooth, dry, hard-surfaced runway; and

(ii) Each type of unpaved runway surface for which approval is requested under § 25.241.

(2) For seaplanes and amphibians, smooth water.

(3) For skiplanes, smooth dry snow.

Explanation. The FAA is aware of a growing need for the use of transport category airplanes on unpaved runway surfaces. This is one of several proposals affecting §§ 25.105, 25.125, and 25.1533, and a proposed new 25.241, which would establish certification standards for transport category airplanes intended to be used in operations on unpaved runways. The FAA has determined that airplane acceleration and braking performance on unpaved runway surfaces, par-

ticularly those that are composed, in part, of loose stones or gravel, pose a hazard to the airplane because such loose objects may cause structural damage by being deflected into the airplane structure by the landing gear, by jet blast, or by prop wash. Similarly, engine ingestion of loose, flying objects may also occur. Such ingestion can cause engine failure during the critical takeoff phase of flight. The proposal would require that takeoff and landing data for each type of surface for which approval is requested be determined by test. In addition, proposed new § 25.241 would require testing for the effects of impingement or ingestion of objects making up part of the surface if impingement or ingestion is likely in service. New § 25.241 would also require that the surface types be defined in such a way that they can be identified in service, and that the identification include characteristics, knowledge of which by the pilot is necessary for safe operations. The FAA believes that a mere description of a runway as being gravel or sod, for example, may not provide an operator with sufficient information for safe operation, since runways so described may vary greatly with respect to performance. Finally, proposed new § 25.1533(c) would require that operating limitations that account for pertinent runway characteristics and operating characteristics necessary for safe operation be established for the types of unpaved runway surfaces on which the airplane may be operated. Under § 25.1583(h) such information would also be included in the Airplane Flight Manual.

Ref. Proposal Nos. 1023, 1031, 822; §§ 25.105(c) (1), 25.125(b) (1), 25.1533(c).

§ 25.107 [Amended]

2-50. By amending § 25.107(b) (1) (1) and (b) (2) (1) by inserting the words "and reciprocating engine" between the words "turbo-propeller" and "powered" in both subdivisions.

Explanation. See the explanation for the proposed deletion of §§ 25.45 through 25.75.

Ref. Proposal No. 1021; §§ 25.45 through 25.75.

2-51. By deleting the semicolon at the end of § 25.125(b) (1) and the semicolon and the word "and" from § 25.125(b) (2) and inserting periods; by redesignating § 25.125(b) (1), (2), and (3) as (b) (2), (3), and (4), respectively; by revising the lead-in of § 25.125(b), and by adding a new § 25.125(b) (1), to read as follows:

§ 25.125 Landings.

(b) The following apply to determinations of landing distance for landplanes and amphibians:

(1) The landing distance must be based on—

(i) A level, smooth, dry, hard-surfaced runway; and

(ii) Each type of unpaved runway surface for which approval is requested under § 25.241.

Explanation. See the proposal for § 25.105(c).

Ref. Proposal Nos. 1023, 1031, 822, §§ 25.105(e) (1), 25.125(b) (1), 25.1533(c).

2-52. By adding a new § 25.241 to read as follows:

§ 25.241 Takeoff and landing on unpaved runway surfaces.

To obtain approval for takeoff and landing operations on unpaved runway surfaces, compliance with the following must be shown:

(a) Each type of surface must be defined so that it can be identified in operations in service. The identification must include specification of all characteristics of the surface necessary for safe operation.

(b) It must be demonstrated that the airplane can be operated on each defined surface without hazard from likely impingement or engine ingestion of any foreign objects that are constituent parts of the surface.

(c) The takeoff and landing performance on each defined surface must be determined in accordance with §§ 25.105(c) (1) and 25.125(b) (1), respectively.

Explanation. See the proposal for § 25.105(c).

Ref. Proposed Nos. 1023, 1031, 822; §§ 25.105(c) (1), 25.125(b) (1), 25.1533(c).

2-53. By revising § 25.397(c) to read as follows:

§ 25.397 Control system loads.

(c) *Limit pilot forces and torques.* The limit pilot forces and torques are as follows:

| Control | Maximum forces or torques | Minimum forces or torques |
|--|---------------------------|---------------------------|
| Aleron: | | |
| Stick..... | 100 lbs..... | 40 lbs. |
| Wheel*..... | 80 D in.-lbs.** | 40 D in.-lbs. |
| Elevator: | | |
| Stick..... | 250 lbs..... | 100 lbs. |
| Wheel (symmetrical)..... | 300 lbs..... | 100 lbs. |
| Wheel (unsymmetrical) ¹ | | 100 lbs. |
| Rudder..... | 300 lbs..... | 130 lbs. |

¹ The unsymmetrical force must be applied at one of the normal handgrip points on the periphery of the control wheel.

Explanation. The proposal would update the rule to require substantiation of elevator control wheels for unsymmetrical forces that are often applied to the wheel when it is operated with one hand. In addition, the rule would be revised to reflect the torque requirements it already contains.

Ref. Proposal No. 1052; § 25.397(c).

2-54. By revising the lead-in of § 25.603 to read as follows:

§ 25.603 Materials.

The suitability and durability of materials used for parts, the failure of which could adversely affect safety, must—

Explanation. The proposal would broaden the present requirement to include parts that may not be in the struc-

ture but are subject to stresses or environmental conditions that could cause a failure with an adverse affect on safety.

Ref. Proposal No. 212; § 25.603.

2-55. By revising § 25.675(a) to read as follows:

§ 25.675 Stops.

(a) Each control system must have stops that positively limit the range of motion of each movable aerodynamic surface controlled by the system.

Explanation. The proposal would extend the present rule to cover all aerodynamic surfaces because the FAA has determined from service experience that safety would be enhanced if the travel of all such surfaces is positively limited.

Ref. Proposal No. 624; § 23.675.

§ 25.685 [Amended]

2-56. By amending § 25.685(a) by deleting the word "or" after "passengers", and by striking the period after the word "objects" and inserting a comma in its place, followed by the words "or the freezing of moisture."

Explanation. The proposed change would require that control system designs account for the effects of freezing moisture which is one of the most common causes of jamming. The present rule does not clearly cover this.

Ref. Proposal No. 225; § 25.685.

2-57. By adding a new § 25.733(c) to read as follows:

§ 25.733 Tires.

(c) Each tire installed on a retractable landing gear system must, at the maximum size of the tire type expected in service, have a clearance to surrounding structure and systems that is adequate to prevent contact between the tire and any part of the structure or systems.

Explanation. The proposed rule would require that the selection of tires for installation on retractable landing gear mechanisms take into account the tire production tolerances and size increases that would be expected to result from service. The FAA believes compliance with the proposed rule could prevent accidents that might result from jamming of landing gear mechanisms by oversize tires.

Ref. Proposal No. 1069; § 25.733(c).

2-58. By adding a new § 25.775(e) to read as follows:

§ 25.775 Windshields and windows.

(e) 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.

Explanation. Sudden opaqueness of a windshield panel has occurred. The proposed rule would ensure at least one clear panel in front of the pilots in such cases,

without restricting design freedom by requiring more than one panel in front of any one pilot seat.

Ref. Proposal No. 232; § 25.775.

2-59. By revising the second sentence of § 25.783(g) to read as follows:

§ 25.783 Doors.

(g) * * * If an integral stair is installed in a passenger entry door that is qualified as a passenger emergency exit, the stair must be designed so that under the following conditions the rate of passenger emergency egress will not be impaired:

(1) The door, integral stair, and operating mechanism have been subjected to the inertia forces specified in § 25.561 (a) (3) acting separately relative to the surrounding structure.

(2) The airplane is in the normal ground attitude and in each of the attitudes corresponding to collapse of one or more legs of the landing gear.

Explanation. The proposed change would clarify the present rule.

Ref. Proposal No. 905; 29.783(g).

2-60. By striking the paragraph designation "(i)" and inserting "(j)" in its place of § 25.785(g); inserting a comma between the words "seat" and "berth" and by deleting the words "or harness," between the words "belt" and "at" and inserting the words ", harness, or both" in place thereof in the first sentence of § 25.785(i), by redesignating that paragraph § 25.785(i) as § 25.785(j), by redesignating § 25.785(h) as § 25.785(i), and by adding a new § 25.785(h) to read as follows:

§ 25.785 Seats, berths, safety belts, and harnesses.

(h) Each forward observer's seat required by the operating rules must be shown to be suitable for use in conducting the en route inspections prescribed by § 121.581(a).

Explanation. The proposed rule would correct a problem that has arisen because the intended use of forward observer seats was not taken into account during certification. It should be noted that § 25.785(g) of the rule covers the harness and strength requirements of these seats. Several other clarifying and editorial changes are also proposed.

Ref. Proposal No. 1076; § 25.785.

§ 25.787 [Amended]

2-61. By amending § 25.787 in a manner substantively identical to that proposed for § 23.787.

§ 25.815 [Amended]

2-62. By amending the table in § 25.815 by placing an asterisk after the number "12" on the first line of the table, and adding a footnote to the table to read, "A narrower width not less than 9 inches may be approved when substantiated by tests found necessary by the Administrator."

Explanation. The proposed change would recognize the FAA practice with regard to approving narrower aisles when tests satisfy the Administrator that they are safe.

Ref. Proposal No. 727; § 25.815.

2-63. By revising §§ 25.831(e) and adding a new § 25.831(f) to read as follows:

§ 25.831 Ventilation.

(e) Except as provided in paragraph (f) of this section, there must be a means to enable the crew to control the temperature and quantity of ventilating air supplied to the crew compartment, independently of the temperature and quantity of air supplied to other compartments.

(f) Means to control the temperature and ventilating air flow in the crew compartment independently of the temperature and air flow in the passenger compartment are not required if all of the following conditions are met:

(1) The total volume of the crew and passenger compartments is 800 cubic feet or less.

(2) The air inlets and passages for air to flow between crew and passenger compartments are arranged to provide compartment temperatures within 5° F. of each other and adequate ventilation to occupants in both compartments.

(3) The temperature and ventilation controls are accessible to the pilot.

Explanation. The proposal would revise the current rule requiring independent controls on all transport aircraft to permit the use of common controls under the specified conditions. The FAA believes independent controls do not contribute significantly to airworthiness if those specified conditions are met.

Ref. Proposal No. 729; § 25.831(f).

§ 25.841 [Amended]

2-64. By amending § 25.841 by inserting the words "cabin pressure altitude" in place of the words "absolute pressure", "cabin absolute pressure", or "absolute pressure in the cabin" wherever those words appear in paragraphs (b) (5) and (b) (6); by inserting the word, "exceeds" in place of the words, "is below that equivalent to", in paragraphs (b) (6); and by revising the first sentence of paragraph (b) (1) and by adding a new paragraph (b) (8) to read as follows:

(b) * * *

(1) Two pressure relief valves to automatically limit the positive pressure differential to a predetermined value at the maximum rate of flow delivered by the pressure source. * * *

(8) The pressure sensors necessary to meet the requirements of paragraphs (b) (5) and (b) (6) of this section and § 25.1447(c), must be located and the sensing system designed so that, in the event of loss of cabin pressure in any passenger or crew compartment, the warning and automatic presentation devices, required by those provisions, will

be actuated without any delay that would significantly increase the hazards resulting from decompression.

Explanation. The FAA believes that the rule should not require that one of the pressure relief valves be a pressure regulating valve. Other acceptable means should be allowed if compliance can be shown. The proposal would delete, as unnecessary, the requirement that one of the pressure relief valves be a pressure regulating valve, but would still permit such a design.

The proposed rule would also require design considerations to account for possible significant differences in decompression rates in separate occupied areas of airplanes. If significant differences can occur, the sensing system and oxygen presentation system must be designed to prevent significant increases in the hazards resulting from decompression. Also, see the proposal for § 23.841.

Ref. Proposal No. 97, 136, 254; §§ 23.841(e), 23.841(f), 25.841, 25.841(b).

2-65. By revising § 25.853(c) to read as follows:

§ 25.853 Compartment interiors.

(c) If smoking is to be prohibited, there must be a placard so stating, and if smoking is to be allowed—

(1) There must be an adequate number of self-contained, removable ash trays; and

(2) Where the crew compartment is separated from the passenger compartment, there must be at least one sign (using either letters or symbols) notifying all passengers when smoking is prohibited. Signs which notify when smoking is prohibited must—

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

(ii) When illuminated internally, be so constructed that the crew can turn them on and off.

Explanation. See the proposal for § 23.853(c).

Ref. Proposal No. 911; § 29.853.

§ 25.933 [Amended]

2-66. By adding at the end of the first sentence of § 25.933(b) the phrase, "including ground operation".

Explanation. The proposal would make clear that ground operations of the airplane must be considered in complying with § 25.933(b).

Ref. Proposal No. 268; § 25.933(b).

2-67. By adding a new § 25.941 following § 25.939 to read as follows:

§ 25.941 Inlet, engine, and exhaust compatibility.

For airplanes using variable inlet or exhaust system geometry, or both,

(a) The system comprised of the inlet, engine (including thrust augmentation systems, if incorporated), and exhaust must be shown to function prop-

erly under all operating conditions for which approval is sought, including all engine rotating speeds and power settings, and engine inlet and exhaust configurations; and

(b) The dynamic effects of the operation of these systems (including consideration of probable malfunctions) upon the aerodynamic control of the airplane may not result in any condition that would require exceptional skill, alertness, or strength on the part of the pilot to avoid exceeding an operational or structural limitation of the airplane.

Explanation. Inlet, engine, and exhaust compatibility is affected by the greater system complexities, and the risk of unsuitable systems necessitates not only substantiation of the individual components but also a complete evaluation of their interrelated effects, including the consequences of malfunctions, and effects of operation and malfunctions in those systems upon the aerodynamic and control characteristics of the airplane.

Ref. Proposal No. 742; § 25.941.

§ 25.951 [Amended]

2-68. By amending § 25.951(a) by inserting the phrase "and auxiliary power unit" between the words "engine" and "functioning" and by adding the phrase "and during which the engine or auxiliary power unit is permitted to be in operation" at the end of the paragraph.

Explanation. Current § 25.951(a) does not specifically provide fuel system design requirements relating to proper auxiliary power unit operation. The proposal would provide such requirements.

Ref. Proposal No. 743; § 25.951(a).

2-69. By adding new §§ 25.979 (d) and (e) to read as follows:

§ 25.979 Pressure fueling system.

(d) The airplane pressure fueling system must have proof and ultimate factors of not less than 1.33 and 2.0, respectively, under the loads arising from the maximum pressures, including surge, that are likely to occur during fueling. The maximum surge pressure must be established with any combination of tank valves being either intentionally or inadvertently closed.

(e) The airplane defueling system must have proof and ultimate factors of not less than 1.33 and 2.0, respectively, under the loads produced when defueling at the maximum permissible defueling pressure (positive or negative) at the airplane fueling connection.

Explanation. The proposal provides strength requirements including load factors, applicable to the airplane fueling system to cover surge pressures during refueling and defueling.

Ref. Proposal No. 279; § 25.979(d) (e).

2-70. By revising § 25.999(b) to read as follows:

§ 25.999 Fuel system drains.

(b) Each drain required by paragraph (a) of this section must—

(1) Discharge clear of all parts of the airplane;

(2) Have manual or automatic means for positive locking in the closed position; and

(3) Have a quick actuation drain valve that is readily accessible and which can be easily opened and closed. Each such valve must be either located or protected so that it will not be damaged in the event of a landing with landing gear retracted.

Explanation. Current §§ 23.999 and 25.999 do not require quick actuation type drain valves and do not provide adequate standards for such valves, if installed. The absence of a quick actuation type drain valve has been suggested as a contributing factor in accidents caused by water contamination of fuel. The proposal would require the installation of quick actuation type drain valves and would provide standards relating to such installations.

Ref. Proposal No. 753; § 25.999(b).

2-71. By adding a new § 25.1027(d) to read as follows:

§ 25.1027 Propeller feathering system.

(d) Provision must be made to prevent sludge or other foreign matter from affecting the safe operation of the propeller feathering system.

Explanation. The proposal is identical to § 23.1027(d), and it is directed at protecting propeller feathering system operation from the adverse effects of sludge and other foreign matter.

Ref. Proposal No. 283; § 25.1027(d).

2-72. By revising § 25.1041 to read as follows:

§ 25.1041 General.

The powerplant and auxiliary power unit cooling provisions must be able to maintain the temperatures of powerplant components, engine fluids, and auxiliary power unit components and fluids within the temperature limits established for these components and fluids, under ground, water, and flight operating conditions, and after normal engine or auxiliary power unit shutdown, or both.

Explanation. The proposal would provide a general cooling requirement for auxiliary power units. It should be noted that § 25.1041 contains only a general cooling requirement, while §§ 25.1043 and 25.1045 are more specific with respect to the types of operating conditions to be considered during tests.

Ref. Proposal No. 755; § 25.1041.

2-73. By revising § 25.1091(c) (2) to read as follows:

§ 25.1091 Air induction.

(c)

(2) For reciprocating engines, there are means to prevent the emergence of backfire flames.

Explanation. Proposed § 25.1091(c) (2) would clarify the applicability of the re-

quirement contained in the current paragraph.

Ref. Proposal No. 284; § 25.1091.

§ 25.1093 [Amended]

2-74. By amending § 25.1093 in a manner substantively identical to that proposed for § 23.1093.

2-75. By adding a new lead-in sentence to § 25.1125 and by revising § 25.1125(a) (3) to read as follows:

§ 25.1125 Exhaust heat exchangers.

For reciprocating engine powered airplanes, the following apply:

(a)

(3) Each exchanger must have cooling provisions wherever it is subject to contact with exhaust gases. Those cooling provisions must be designed and installed so that it is not possible to use a heat exchanger unless its cooling provisions are in operation; and

Explanation. The proposal would require that it be impossible to use a heat exchanger unless its required cooling provision is in operation. The FAA is unaware of any heat exchanger that comes in contact with exhaust gases that would not be subject to a hazardous condition if it did not have some type of operational cooling provision. The proposal also would make it clear that the section applies only to reciprocating engine powered airplanes.

Ref. Proposal No. 288; § 25.1125(a).

§ 25.1143 [Amended]

2-76. By amending § 25.1143 in a manner substantively identical to that proposed for § 23.1143, and by revising paragraph (d) to read as follows:

(d) If there is a fluid injection (other than fuel) system, the flow of injection system fluid must be automatically controlled with relation to the amount of power produced by the engine. In addition to the automatic control, there must be a separate control for the injection system pumps.

Explanation. The proposal would clarify and update the terminology used in § 25.1143. The term "fluid" is used to provide for water mixtures.

Ref. Proposal No. 767; § 25.1143.

2-77. By adding a new § 25.1167 following § 25.1165 to read as follows:

§ 25.1167 Accessory gearboxes.

For airplanes equipped with an accessory gearbox that is not certificated as part of an engine—

(a) The engine with gearbox and connecting transmissions and shafts attached must be subjected to the tests specified in §§ 33.49 or 33.87 of this chapter, as applicable;

(b) The accessory gearbox must meet the requirements of §§ 33.25 and 33.53 or 33.91 of this chapter, as applicable; and

(c) Possible misalignments and torsional loadings of the gearbox, transmission, and shaft system, expected to re-

sult under normal operating conditions must be evaluated.

Explanation. The airframe manufacturer may choose to supply the accessory gearbox as part of the airframe. In this case, substantiation of the accessory gearbox as part of the airframe will require testing comparable to that used in the substantiation of the gearbox when approved as part of the engine. The gearbox, as part of the airframe, may still be driven by a power takeoff shaft from the engine rather than by electric or hydraulic motors which would require that the drive shaft between the gearbox and the engine be substantiated. In addition, the possibility of misalignment of the shaft must be evaluated. The proposal would provide for such substantiation and evaluation.

Ref. Proposal No. 770; § 25.1167.

2-78. By revising § 25.1197(a) to read as follows:

§ 25.1197 Fire extinguishing agents.

(a) Fire extinguishing agents must be capable of extinguishing flames emanating from any burning of fluids or other combustible materials in the area protected by the fire extinguishing system. In addition, those agents must have thermal stability over the temperature range likely to be experienced in the compartment in which they are stored.

Explanation. Current rules prescribe that extinguishing agents must be methyl bromide, carbon dioxide, or an agent with equal extinguishing action. While there are airplanes in service having extinguishing systems that use the prescribed agents, new installations use newer agents. One agent that is widely used is bromotrifluoromethane. The FAA considers it appropriate to recognize the fact that new agents are being used and to change the rules to prescribe the objective rather than specific agents.

Ref. Proposal No. 777; § 25.1197(a).

2-79. By revising § 25.1303(a) (2) to read as follows:

§ 25.1303 Flight and navigation instruments.

(a)

(2) A clock (sweep-second pointer or digital reading in hours, minutes, and seconds).

Explanation. The requirement for a clock with a sweep second pointer does not recognize the development of accurate digital clocks. The proposal would permit the utilization of approved digital clocks.

Ref. Proposal No. 293; § 25.1303(a) (2).

2-80. By adding a new § 25.1305(f) to read as follows:

§ 25.1305 Powerplant instruments.

(f) For airplanes equipped with fluid augmentation systems (other than fuel), an approved means must be provided to indicate the proper functioning of that system to the flight crew.

PROPOSED RULES

Explanation. Engine manufacturers specify fluid flow rates needed to obtain wet takeoff power. The proposal would require that a means be provided to indicate to the flight crew the proper functioning of the fluid augmentation system.

Ref. Proposal No. 767; § 25.1143.

§ 25.1309 [Amended]

2-81. By inserting a comma between the words "Equipment" and "systems" and between the words "systems" and "and", in the title of § 25.1309.

Explanation. The proposal is editorial in nature.

Ref. None.

2-82. By adding a new § 25.1322 to read as follows:

§ 25.1322 Warning, caution, and advisory lights.

If warning, caution or advisory lights are installed, they must, unless otherwise approved by the Administrator, be—

- (a) Red, for warning lights (lights indicating a hazard which may require immediate corrective action);
- (b) Amber, for caution lights (lights indicating the possible need for future corrective action);
- (c) Green, for safe operation lights;
- (d) Blue, for position indication, agreement, and correct response lights; and
- (e) Any other color, including white, for lights not described in paragraphs (a) through (d) of this section, provided the color differs sufficiently from the colors prescribed in paragraphs (a) through (d) of this section to avoid possible confusion.

Explanation. See the proposal for § 23.1322.

Ref. Proposal No. 792; § 25.1322.

§ 25.1325 [Amended]

2-83. By adding a new § 25.1325(g) that would be substantively identical to the proposed new § 23.1325(c).

2-84. By redesignating § 25.1329 as § 25.1311 and by revising the title and paragraphs (a) and (g) of the section to read as follows:

§ 25.1311 Automatic flight control systems.

(a) Each automatic flight control system must be approved and must be designed so that it can be quickly and positively disengaged by the pilots to prevent it from interfering with their control of the airplane.

(g) If the flight control system integrates signals from auxiliary controls or furnishes signals for operation of other equipment, there must be positive interlocks and sequencing of engagement to prevent improper operation. Protection against adverse interaction of integrated components, resulting from a malfunction, is also required.

Explanation. The proposal would provide an appropriate location for the current requirements of § 25.1329 and would

also provide a location for additional provisions relating to automatic flight control system.

Ref. Proposal No. 1315; § 25.1329.

2-85. By revising § 25.1331(a) (2) to read as follows:

§ 25.1331 Instruments using a power supply.

(a) . . .

(2) Each instrument must, in the event of the failure of one power source, be supplied by another power source. This may be accomplished automatically or by manual means provided that instrument operation is maintained.

Explanation. The proposal would revise § 25.1331(a) (2) to make it clear that dual inputs or instrument switching circuits are not required; however, each instrument required by § 25.1303(b) that uses a power supply should and would continue to be covered by § 25.1331(a) (2).

Ref. Proposal No. 302; § 25.1331.

§ 25.1337 [Amended]

2-86. By inserting the phrase "and auxiliary power unit" between the words "powerplant" and "instrument" in the first sentence of § 25.1337(a).

Explanation. The proposal would make the provisions of §§ 25.993 and 25.1183 clearly applicable to auxiliary power unit instrument lines.

Ref. Proposal No. 797; § 25.1337(a).

2-87. By adding a new § 25.1353(c) (5) to read as follows:

§ 25.1353 Electrical equipment and installation.

(c) . . .

(5) Nickel cadmium battery installations capable of being used to start an engine or auxiliary power unit must have—

- (i) A system to control the charging rate of the battery automatically so as to prevent battery overheating;
- (ii) A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or
- (iii) A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of battery failure.

If compliance is shown with subparagraph (ii) or (iii) of this paragraph the operating procedures for disconnecting the battery from its charging source must be established and included in the Airplane Flight Manual.

Explanation. See the proposal for § 23.1353(f).

Ref. Proposal No. 799; § 25.1353(c).

2-88. By revising § 25.1355(c) to read as follows:

§ 25.1355 Distribution system.

(c) If two independent sources of electrical power for particular equipment or

systems are required by this chapter, in the event of the failure of one power source for such equipment or system, another power source (including its separate feeder) must be automatically provided or be manually selectable to maintain equipment or system operation.

Explanation. The proposal would revise § 25.1355 to eliminate provisions that are unduly restrictive due to their specificity. It should be noted that the independent sources of power would be required to have separate feeders.

Ref. Proposal No. 309; § 25.1355(c).

2-89. By revising §§ 25.1385 (b), (c) and (e) to read as follows:

§ 25.1385 Position light system installation.

(b) *Forward position lights.* Forward position lights must consist of a red and a green light spaced laterally as far apart as practicable, taking into consideration the factors specified in paragraph (e) of this section, and installed forward on the airplane so that, with the airplane in the normal flying position, the red light is on the left side, and the green light is on the right side. Each light must be approved.

(c) *Rear position light.* The rear position light must be a white light mounted as far aft as practicable, taking into consideration the factors specified in paragraph (e) of this section, and must be approved.

(e) The following factors may be taken into consideration to establish that it is impracticable to locate the forward and rear position lights at the appropriate airplane extremities and to establish the most effective practicable locations:

- (1) The effect on lamp life of the lamp location.
- (2) The effect on the lights of heat or vibration caused by the proximity of the lights to powerplant installations.
- (3) The accessibility of the lights for servicing.

Explanation. The proposal would revise § 25.1385 to make more clear the circumstances in which forward and rear position lights may be located at other than the appropriate airplane extremities. The proposal would also delete the requirements of § 25.1385(e) applicable to passing lights. Those lights have become obsolete.

Ref. Proposals Nos. 310, 311; §§ 25.1385 (c), 25.1385(e).

2-90. By adding a new § 25.1403 to read as follows:

§ 25.1403 Wing icing detection lights.

Unless operations at night in known or forecast icing conditions are prohibited by an operating limitation, a means must be provided for illuminating or otherwise determining the formation of ice on the parts of the wings. Any illumination that is used must be of a type that will not cause glare or reflection that would handicap crewmembers in the performance of their duties.

Explanation. Section 121.341(b) prohibits the operation of an airplane in icing conditions at night unless there are lighting provisions as proposed. The FAA believes that such a requirement should apply to all newly certificated transport category airplanes if operations in icing conditions at night are to be permitted under the airplane's operating limitations.

Ref. Proposal No. 802; § 25.1403.

2-91. By adding a sentence to § 25.1439 (a) and by revising § 25.1439(b) (2) (ii) to read as follows:

§ 25.1439 Protective breathing equipment.

(a) * * * In addition, protective breathing equipment must be installed in each isolated separate compartment in the airplane, including upper and lower lobe galleys, in which crewmember occupancy is permitted during flight for the maximum number of crewmembers expected to be in the area during any operation.

(b) * * *
(2) * * *

(ii) Masks covering the nose and mouth, plus accessory equipment to cover the eyes to prevent the entry of smoke and noxious gases into the masks and coverings. A means must be provided to clear the masks and coverings of any smoke or noxious gas that might be trapped when the masks and coverings are donned.

Explanation. The proposal would require protective breathing equipment for crewmembers expected in isolated areas. The need for this proposal is based on recent service experience. In addition the proposal would also make it clear that the required masks and eye coverings must prevent the entry of smoke and noxious gases and that a means must exist to expel any trapped smoke and gases in the masks and coverings.

Ref. Proposal No. 812; § 25.1439(a), (b).

2-92. By revising § 25.1515(a) to read as follows:

§ 25.1515 Landing gear speeds.

(a) The established landing gear operating speed or speeds, V_{LO} , may not exceed the speed at which it is safe both to extend and to retract the landing gear, as determined under § 25.729 or by flight characteristics. If the extension speed is not the same as the retraction speed, the two speeds must be designated as $V_{LO(EXT)}$ and $V_{LO(RET)}$, respectively.

Explanation. Section 25.1515(a) limits V_{LO} to a single speed. It has been shown, however, that for most transport category airplanes, it is advantageous and in the interest of safety to permit the selection of different (usually higher) landing gear extension speeds than those for landing gear retraction. Such different speeds enhance safety in descent operations since an additional margin of flight path control would be provided

in a configuration in which it is most needed (high speed let-down at near idle thrust).

Ref. Proposal No. 819; § 25.1515(a).

2-93. By revising the title of § 25.1533 and the lead in of paragraph (a), and by adding a new § 25.1533(c) to read as follows:

§ 25.1533 Additional operating limitations.

(a) Additional operating limitations must be established as follows:

(c) The types of runways on which landplanes and amphibians may be operated are those for which compliance has been shown with §§ 25.105(c) (1), 25.125(b) (1), and 25.241. For runways other than smooth, hardsurfaced runways, the operating limitations must include any runway characteristic or operating restriction found necessary for safe operation on the particular type of surface.

Explanation. See the explanation for the proposed deletion of §§ 25.45 through 25.75. See also the proposal for § 25.105(c).

Ref. Proposal No. 1021, 1023, 1031, 822; §§ 25.45 through 25.75, 25.105(c) (1), 25.125(b) (1), 25.1533(c).

2-94. By revising § 25.1549 to read as follows:

§ 25.1549 Powerplant instruments.

For each required powerplant instrument, as appropriate to the type of instrument,

(a) Each maximum and, if applicable, minimum safe operating limit must be marked with a red radial or red horizontal line;

(b) Each normal operating range must be marked with a green arc or green vertical line, not extending beyond the maximum and minimum safe limits;

(c) Each takeoff and precautionary range must be marked with a yellow arc or yellow vertical line; and

(d) Each engine or propeller range that is restricted because of excessive vibration stresses must be marked with red arcs or red vertical lines.

Explanation. The present rule deals only with marking conventional round faced instruments. The proposal would update the rule to provide similar specific requirements for marking vertical tape instruments. The FAA believes specificity in this regard is necessary to promote cockpit instrument standardization, a long-standing FAA goal.

Ref. Proposal No. 824; § 25.1549.

2-95. By revising § 25.1557(b) to read as follows:

§ 25.1557 Miscellaneous markings and placards.

(b) Fuel and oil filler openings. The following apply:

- (1) Fuel filler openings must be marked at or near the filler cover with—
 - (i) The word "fuel";

(ii) For reciprocating engine powered airplanes, the minimum fuel grade;

(iii) For turbine engine powered airplanes, the permissible fuel designations; and

(iv) For pressure fueling systems, the maximum permissible fueling supply pressure and the maximum permissible defueling pressure.

(2) Oil filler openings must be marked at or near the filler cover with the word "oil".

Explanation. The proposed revision includes both substantive and clarifying changes. The substantive changes would require marking of maximum permissible pressure differentials for both fueling and defueling at pressure fueling points, and would delete as unnecessary the requirement for marking fuel and oil tank capacities at the filler openings. In addition, the rule would be revised to clarify that the term "minimum fuel grade" applies only to reciprocating engine powered airplanes and that fuel "designation" applies to turbine engine powered airplanes.

Ref. Proposal No. 328; § 25.1557(b).

2-96. By adding a new § 25.1581(d) to read as follows:

§ 25.1581 General.

(d) Each manual must include a table of contents if the complexity of the manual indicates a need for it.

Explanation. See the proposal for § 23.1581.

Ref. Proposal No. 828; § 25.1581(d).

2-97. By revising the lead in of § 25.1583(a) and §§ 25.1583 (a) (5) and (h) to read as follows:

§ 25.1583 Operating limitations.

(a) *Airspeed limitations.* The following airspeed limitations and any other airspeed limitations necessary for safe operation must be furnished.

(5) The landing gear operating speed or speeds, and a statement explaining the speeds as defined in § 25.1515(a).

(h) *Additional operating limitations.* The operating limitations established under § 25.1533 must be furnished.

Explanation. Section 25.1545, which is cross referenced in the present requirement, contains the independent requirement that markings and placards relating to airspeed limitations must be easily read and understood by the flight crew. It should be noted that the information required by § 25.1583(a) is subject to FAA approval and that such approval may extend to the manner of presentation. The proposal would therefore delete the cross reference to § 25.1545, and make provision for any additional airspeed limitations found necessary for safety on a particular design.

The proposal would also revise §§ 25.1583 (a) (5) and (h) in light of the proposal for § 25.1515(a) and the proposed

deletion of §§ 25.45 through 25.75, respectively.

Ref. Proposal Nos. 332, 330, 1021; §§ 25.1583(a), 25.1583(a)(5), 25.45 through 27.75.

2-98. By revising § 25.1587 to read as follows:

§ 25.1587 Performance information.

(a) Each Airplane Flight Manual must contain information to permit conversion of the indicated temperature to free-air temperature if other than a free-air temperature indicator is used to comply with the requirements of § 25.1303 (a) (1).

(b) Each Airplane Flight Manual must contain the performance information computed under the applicable provisions of this Part (including §§ 25.115, 25.123, and 25.125 for the weights, altitudes, temperatures, wind components, and runway gradients, as applicable) within the operational limits of the airplane, and must contain the following:

(1) The conditions under which the performance information was obtained, including the speeds associated with the performance information.

(2) V_0 determined in accordance with § 25.103.

(3) The following performance information (determined by extrapolation and computed for the range of weights between the maximum landing and maximum takeoff weights):

(i) Climb in the landing configuration.

(ii) Climb in the approach configuration.

(iii) Landing distance.

(4) Procedures established under § 25.101(c) that are related to the limitations and information required by § 25.1533 and by this paragraph. These procedures must be in the form of guidance material, including any relevant limitations or information.

(5) An explanation of significant or unusual flight or ground handling characteristics of the airplane.

Explanation. Except for the proposed change to (b) (1) (previously (c) (1) and new (b) (2)), see the explanation for the proposed deletion of §§ 25.45 through 25.75. The proposed amendment to (b) (1) (previously (c) (1)) will clarify that the relevant conditions include the speeds involved. New (b) (2) is proposed because the FAA believes it is important to include V_0 s in the performance information.

Ref. Proposal Nos. 836, 1021; § 25.1587, § 25.45.

PART 27—AIRWORTHINESS STANDARDS:
NORMAL CATEGORY ROTORCRAFT

2-99. By adding a new § 27.25(c) to read as follows:

§ 27.25 Weight limits.

(c) Total weight with jettisonable external load. A total weight for the rotorcraft with jettisonable external load attached that is greater than the maximum weight established under paragraph (a) of this section may be established if—

(1) The portion of the total weight that is greater than the maximum weight established under paragraph (a) of this section is made up only of the weight of all or part of the jettisonable external load; and

(2) Structural components of the rotorcraft are shown to comply with the applicable structural requirements of this part under the increased loads and stresses caused by the weight increase over that established under paragraph (a) of this section.

Explanation. The proposals for this section and the proposal for § 29.75 are intended to remove certain airworthiness requirements from Part 133 and place them in Parts 27 and 29 and to provide for the approval of external load operations at weights greater than the maximum weight. Also see the proposals for Part 133.

Ref. Proposal No. 539; § 133.43(c).

2-100. By revising § 27.65(a) (2) to read as follows:

§ 27.65 Climb.

(a)
(2) The climb gradient, at the rate of climb determined in accordance with paragraph (a) (1) of this section, must be either—

(i) At least 1:10 if the horizontal distance required to take off and climb over a 50-foot obstacle is determined for each weight, altitude, and temperature within the range for which certification is requested; or

(ii) At least 1:6 at standard sea level conditions.

Explanation. Section 27.65 presently requires that rotorcraft other than helicopters meet a climb gradient, at the prescribed rate of climb, of at least 1:6 at standard sea level conditions. The FAA has found that this climb gradient is unnecessarily restrictive for gyroplanes and that there would not be any adverse effect on safety if a lower gradient is used, provided that necessary data on obstacle clearance is determined over the range of weights, altitudes, and temperatures for which certification is sought and made available in the Rotorcraft Flight Manual. The proposal would permit a climb gradient of 1:10, provided that the horizontal distance required to take off and climb over a 50-foot obstacle is determined. A separate, related proposal would specify the inclusion of this information in the Rotorcraft Flight Manual (ref. § 27.1587(b) (3)).

Ref. Proposal No. 833; § 27.65(a) (2).

2-101. By revising the lead-in of § 27.141(a) and §§ 27.141 (a) (3) and (a) (4), to read as follows:

§ 27.141 General.

(a) Except as specifically required in the applicable section, meet the requirements of this section and of §§ 27.143, 27.161, and 27.171 through 27.175—

(3) For power-on operations, under any condition of speed, power, and rotor

r.p.m. for which certification is requested; and

(4) For power-off operations, under any condition of speed and rotor r.p.m. for which certification is requested that is attainable with the controls rigged in accordance with the approved rigging instructions and tolerances;

Explanation. Present § 27.141(a) (4) is not a flight characteristics requirement but, rather, is a turbine engine operating characteristic requirement, covered by § 27.939. The proposal would delete current § 27.141(a) (4).

Present § 27.141(a) (3) requires compliance with certain flight characteristics requirements under any condition of speed, power, and rotor r.p.m. for which certification is requested. For some rotorcraft, the maximum rotor r.p.m. limit established to accommodate power-on conditions cannot reasonably be attained in power-off conditions unless the controls are rerigged beyond the tolerances for which the rotorcraft is to be certificated. This proposal would, for power-off operations, permit a showing of compliance without exceeding the speed and rotor r.p.m. attainable with the controls rigged in accordance with the approved rigging tolerances.

Finally, it is also proposed to amend the lead-in language of paragraph (a) to clarify that compliance with the requirements of the referenced sections need not be shown over the full range of conditions when particular conditions are specified in the section containing the requirement.

Ref. Proposal Nos. 351, 835; 27.141(a) (3), (a) (4).

2-102. By revising § 27.173(a) to read as follows:

§ 27.173 Static longitudinal stability.

(a) The longitudinal cyclic control must be designed so that, with the throttle and collective pitch held constant, during the maneuvers specified in § 27.175 a rearward movement of the control is necessary to obtain a speed less than the trim speed, and a forward movement of the control is necessary to obtain a speed more than the trim speed,—

(1) For power-on operations, over the full range of altitude and rotor r.p.m. for which certification is requested; and

(2) For power-off operations, over the range of altitude and rotor r.p.m. for which certification is requested that is attainable with the controls rigged in accordance with the approved rigging instructions and tolerances.

Explanation. See the proposal for § 27.141(a).

Ref. Proposal No. 350; § 27.173(a).

§ 27.175 [Amended]

2-103. By amending § 27.175(d) (2) (iv) in a manner substantively identical to that proposed for § 29.175(d) (2) (iv).

2-104. By revising § 27.321(a) to read as follows:

§ 27.321 General.

(a) The flight load factor must be assumed to act normal to the longitudinal axis of the rotorcraft, and to be equal in magnitude and opposite in direction to the rotorcraft inertia load factor at the center of gravity.

Explanation. The first sentence of the present section is not realistic for rotorcraft incorporating auxiliary lifting surfaces. The proposal is identical to current § 29.321(a) which is clear and realistic.

Ref. Proposal No. 352; § 27.321(a).

§ 27.339 [Amended]

2-105. By inserting between the words "hub" and "and" in the first sentence of § 27.339, the phrase "and at each auxiliary lifting surface."

Explanation. The proposal would provide for consideration of auxiliary lifting surfaces as points of action for flight loads. Current § 29.339 contains such a provision.

Ref. Proposal No. 353; § 27.339.

2-106. By revising § 27.397, including its title, to read as follows:

§ 27.397 Limit pilot forces and torques.

(a) Except as provided in paragraph (b) of this section, the limit pilot forces are as follows:

- (1) For foot controls, 130 pounds.
- (2) For stick controls, 100 pounds fore and aft, and 67 pounds laterally.

(b) For flap, tab, stabilizer, rotor brake, and landing gear operating controls, the following apply.

(1) Crank, wheel, and lever controls, $\left[\frac{1+R}{3} \right] \times 50$ pounds, but not less

than 50 pounds nor more than 100 pounds for hand operated controls or 130 pounds for foot operated controls, applied at any angle within 20 degrees of the plane of motion of the control. R=radius in inches.

(2) Twist controls, 133 inch-pounds.

Explanation. See the proposal for § 29.397.

Ref. Proposal No. 898; § 29.405.

2-107. By adding a new § 27.563 to read as follows:

§ 27.563 Structural ditching provisions.

Structural strength considerations of ditching must be in accordance with § 27.801(e).

Explanation. See the proposal for § 29.801.

Ref. Proposal No. 356; § 27.563.

2-108. By revising the lead-in of § 27.603 to read as follows:

§ 27.603 Materials.

The suitability and durability of materials used for parts, the failure of which could adversely affect safety, must—

Explanation. See the proposal for § 25.603.

Ref. Proposal No. 212; § 25.603.

§ 27.685 [Amended]

2-109. By amending § 27.685(a) by deleting the word "or" after "passengers", and by striking the period after the word "objects" and inserting a comma in its place, followed by the words "or the freezing of moisture."

Explanation. See the proposal for § 25.865.

Ref. Proposal No. 225; § 25.685.

§ 27.733 [Amended]

2-110. By amending § 27.733 in a manner substantively identical to that proposed for § 23.733.

2-111. By adding a new § 27.787(d) to read as follows:

§ 27.787 Cargo compartments.

(d) Cargo compartment lamps must be installed so as to prevent contact between lamp bulbs and cargo.

Explanation. Continued direct contact between a hot bulb and cargo could cause a fire. A protective metal screen on the lamp could prevent such contact and also protect the bulb to some extent from damage. Hazardous damage to a lamp that could be caused by shifting cargo is required to be accounted for under present paragraph (b) of the rule.

Ref. Proposal No. 96; § 23.787(f).

2-112. By adding a new § 27.801 to read as follows:

§ 27.801 Ditching.

(a) If certification with ditching provisions is requested, the rotorcraft must meet the requirements of this section and §§ 27.807(d), 27.1411 and 27.1415.

(b) Each practicable design measure, compatible with the general characteristics of the rotorcraft, must be taken to minimize the probability that in an emergency landing on water, the behavior of the rotorcraft would cause immediate injury to the occupants or would make it impossible for them to escape.

(c) The probable behavior of the rotorcraft in a water landing must be investigated by model tests or by comparison with rotorcraft of similar configuration for which the ditching characteristics are known. Scoops, flaps, projections, and any other factor likely to affect the hydrodynamic characteristics of the rotorcraft must be considered.

(d) It must be shown that, under reasonably probable water conditions, the flotation time and trim of the rotorcraft will allow the occupants to leave the rotorcraft and enter the life rafts required by § 27.1415. If compliance with this provision is shown by buoyancy and trim computations, appropriate allowances must be made for probable structural damage and leakage. If the rotorcraft has fuel tanks (with fuel jettisoning provisions) that can reasonably be expected to withstand a ditching without leakage,

the jettisonable volume of fuel may be considered as buoyancy volume.

(e) Unless the effects of the collapse of external doors and windows are accounted for in the investigation of the probable behavior of the rotorcraft in a water landing (as prescribed in paragraphs (c) and (d) of this section), the external doors and windows must be designed to withstand the probable maximum local pressures.

Explanation. See the proposal for § 29.801.

Ref. Proposal No. 360; § 27.801.

2-113. By adding a new § 27.807(d) to read as follows:

§ 27.807 Emergency exits.

(d) *Ditching emergency exits for passengers.* Ditching emergency exits must be provided in accordance with the following requirements, unless the emergency exits required by paragraph (a) of this section already meet them:

(1) One exit above the waterline in each side of the rotorcraft, meeting at least the dimensions specified in paragraph (b) of this section.

(2) If side exits cannot be above the waterline, the side exits must be replaced by a readily accessible overhead hatch of not less than the dimensions of the required side exits.

Explanation. The regulation proposed has been taken from § 25.807(d) and reworded to accommodate the considerations appropriate to "small" rotorcraft and regulation numbering. It should be noted that the ditching exits would be required whether or not ditching certification is requested. Also, see the proposal for § 29.801.

Ref. Proposal No. 361; § 27.807.

2-114. By revising § 27.853(c) to read as follows:

§ 27.853 Compartment interiors.

(c) If smoking is to be prohibited, there must be a placard so stating, and if smoking is to be allowed—

(1) There must be an adequate number of self-contained, removable ash trays; and

(2) Where the crew compartment is separated from the passenger compartment, there must be at least one sign (using either letters or symbols) notifying all passengers when smoking is prohibited. Signs which notify when smoking is prohibited must—

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

(ii) When illuminated internally, be so constructed that the crew can turn them on and off.

Explanation. See the proposal for § 23.853(c).

Ref. Proposal No. 911; § 29.853.

2-115. By adding a new center heading and a new § 27.865 following § 27.861 to read as follows:

EXTERNAL LOAD ATTACHING MEANS

§ 27.865 External load attaching means.

(a) It must be shown by analysis or test, or both, that the rotorcraft external-load attaching means can withstand a limit static load equal to 2.5 times the maximum external load for which authorization is requested, applied in the vertical direction and in any direction making an angle of 30 degrees with the vertical, except for those directions having a forward component. However, the 30-degree angle may be reduced to a lesser angle if an operating limitation is established limiting external load operations to such angles for which compliance with this paragraph has been shown.

(b) The external load attaching means for Class B and Class C rotorcraft-load combinations must include a device to enable the pilot to release the external load quickly during flight. This quick-release device, and the means by which it is controlled, must comply with the following:

(1) A control for the quick-release device must be installed on one of the pilot's primary controls and must be designed and located so that it may be operated by the pilot without hazardously limiting his ability to control the rotorcraft during an emergency situation.

(2) In addition a manual mechanical control for the quick-release device, readily accessible either to the pilot or to another crewmember, must be provided.

(3) The quick-release device must function properly with all external loads up to and including the maximum external load for which authorization is requested.

(c) A placard or marking must be installed next to the external-load attaching means stating the maximum authorized external load as demonstrated under § 29.25 and this section.

Explanation. The proposals for § 27.865 and § 29.865 are intended to remove certain airworthiness requirements from § 133.43 and place them in Parts 27 and 29 with certain additions and clarifications. The proposal, if adopted, would provide for the approval of external load operations at weights greater than the maximum weight. See also the proposal for § 27.25.

Ref. Proposal No. 848; § 27.865.

§ 27.903 [Amended]

2-116. By amending § 27.903 in a manner substantively identical to that proposed for § 23.903.

2-117. By adding a new § 27.917(d) to read as follows:

§ 27.917 Design.

(d) The rotor drive system includes any part necessary to transmit power from the engines to the rotor hubs. This includes gear boxes, shafting, universal joints, couplings, rotor brake assemblies, clutches, supporting bearings for shafting, any attendant accessory pads or drives, and any cooling fans that are a

part of, attached to, or mounted on the rotor drive system.

Explanation. The proposal would provide a necessary description of the make-up of rotor drive systems in Part 27. Also, see the proposal for § 29.917.

Ref. Proposal No. 921; § 29.917

§ 27.927 [Amended]

2-118. By deleting the words "one hour" and inserting the words "fifteen minutes" in their place in the last sentence of § 27.927(b)(2).

Explanation. The proposal would reduce the one-hour torque transmission test to fifteen minutes. The FAA believes this is sufficient time to establish the strength of the transmission for the specified condition.

Ref. Proposal No. 849; § 27.927

§ 27.939 [Amended]

2-119. By amending § 27.939 in a manner substantively identical to that proposed for § 29.939.

§ 27.977 [Amended]

2-120. By amending § 27.977 in a manner substantively identical to that proposed for § 23.977.

§ 27.999 [Amended]

2-121. By amending § 27.999(b) in a manner substantively identical to that proposed for § 25.999(b).

2-122. By revising § 27.1043(c) to read as follows:

§ 27.1043 Cooling tests.

(c) *Correction factor (except cylinder barrels).* Unless a more rational correction applies, temperatures of engine fluids and power-plant components (except cylinder barrels) for which temperature limits are established, must be corrected by adding to them the difference between the maximum ambient atmospheric temperature and the temperature of the ambient air at the time of the first occurrence of the maximum component or fluid temperature recorded during the cooling test.

Explanation. The proposal deals with for the utilization of correction factors for engine components other than cylinder barrels for the cooling test. The proposed revisions of §§ 27.1043(c) and 29.1043(c) would make them consistent with §§ 23.1043(c) and 25.1043(c).

Ref. Proposal No. 933; § 29.1043(e).

§ 27.1093 [Amended]

2-123. By adding a new § 27.1093(c) that would be substantively identical to the proposed new § 23.1093(c).

2-124. By adding a new § 27.1123 following § 27.1121 and before the heading "Power Plant Controls and Accessories" to read as follows:

§ 27.1123 Exhaust piping.

(a) Exhaust piping must be heat and corrosion resistant, and must have provisions to prevent failure due to expansion by operating temperatures.

(b) Exhaust piping must be supported to withstand any vibration and inertia loads to which it would be subjected in operations.

(c) Exhaust piping connected to components between which relative motion could exist must have provisions for flexibility.

Explanation. The proposal is similar to the current provisions of §§ 23.1123, 25.1123 and 29.1123. The conditions necessitating the requirements of those sections are also applicable to rotorcraft certificated under Part 27.

Ref. Proposal No. 856; § 27.1123.

§ 27.1143 [Amended]

2-125. By amending § 27.1143 in a manner substantively identical to that proposed for § 23.1143(e).

2-126. By revising § 27.1185(a) and (b) to read as follows:

§ 27.1185 Flammable fluids.

(a) Each fuel tank must be isolated from the engines by a firewall or shroud.

(b) Each tank or reservoir, other than a fuel tank, that is part of a system containing flammable fluids or gases must be isolated from the engine by a firewall or shroud, unless the design of the system, the materials used in the tank and its supports, the shutoff means, and the connections, lines and controls provide a degree of safety equal to that which would exist if the tank or reservoir were isolated from the engines.

Explanation. Section 27.1185(a) and (b) make a distinction in the isolation requirements for fuel and flammable fluid tanks based on the rotorcraft powerplant. The FAA believes the only distinction that is appropriate is between fuel tanks and other flammable fluid tanks and reservoirs. The proposal would provide for such treatment. It should be noted that § 27.1191(f), in part, requires that the shrouds and firewalls required under the proposal must be fireproof.

Ref. Proposal No. 860; § 27.1185.

2-127. By revising § 27.1322 to read as follows:

§ 27.1322 Warning, caution, and advisory lights.

If warning, caution or advisory lights are installed they must, unless otherwise approved by the Administrator, be—

(a) Red, for warning lights (lights indicating a hazard which may require immediate corrective action);

(b) Amber, for caution lights (lights indicating the possible need for future corrective action);

(c) Green, for safe operation lights;

(d) Blue, for position indication, agreement, and correct response lights; and

(e) Any other color, including white, for lights not described in paragraphs (a) through (d) of this section, provided the color differs sufficient from the colors prescribed in paragraphs (a)

through (d) of this section to avoid possible confusion.

Explanation. See the proposal for § 23.1322.

Ref. Proposal No. 865; § 27.1322.

§ 27.1325 [Amended]

2-128. By adding a new § 27.1325(b) that would be substantively identical to the proposed new § 23.1325(c).

2-129. By adding a new § 27.1329 to read as follows:

§ 27.1329 Automatic pilot system.

(a) Each automatic pilot system must be approved, and must be designed so that the automatic pilot can—

(1) Be quickly and positively disengaged by the pilots without moving their hands from the normal position on the cyclic control; or

(2) Be sufficiently overpowered by one pilot to let him control the rotorcraft.

(b) Unless there is automatic synchronization, each system must have a means to readily indicate to the pilot the alignment of the actuating device in relation to the control system it operates.

(c) Each manually operated control for the system's operation must be readily accessible to the pilots.

(d) The system must be designed and adjusted so that, within the range of adjustment available to the pilot, it cannot produce hazardous loads on the rotorcraft, or create hazardous deviations in the flight path, under any flight condition appropriate to its use, either during normal operation or in the event of a malfunction, assuming that corrective action begins within a reasonable period of time.

Explanation. Autopilots are being incorporated in normal category helicopters. The proposal would introduce provisions applicable to such devices into Part 27.

Ref. Proposal No. 868; § 27.1329.

§ 27.1351 [Amended]

2-130. By amending § 27.1351(c) in a manner substantively identical to that proposed for § 23.1351(c).

2-131. By adding a new § 27.1353(f) to read as follows:

§ 27.1353 Storage battery design and installation.

(f) Nickel cadmium battery installations capable of being used to start an engine or auxiliary power unit must have—

(1) A system to control the charging rate of the battery automatically so as to prevent battery overheating;

(2) A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or

(3) A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of a battery failure.

If compliance is shown with subparagraphs (2) or (3) of this paragraph the

operating procedures for disconnecting the battery from its charging source must be established and included in the Rotorcraft Flight Manual.

Explanation. See the proposal for § 23.1353(f).

Ref. Proposal No. 870; § 27.1353(f).

§ 27.1385 [Amended]

2-132. By amending § 27.1385 in a manner substantively identical to that proposed for § 25.1385.

2-133. By redesignating the current language of § 27.1411 as § 27.1411(a) and by adding a new § 27.1411(b) to read as follows:

§ 27.1411 General.

(a)

(b) Stowage provisions for required safety equipment must be furnished and must—

(1) Be arranged so that the equipment is directly accessible and its location is obvious; and

(2) Protect the safety equipment from damage caused by being subjected to the inertia loads specified in § 27.561.

Explanation. The proposal would add a requirement for stowage provisions for all safety equipment in § 27.1411 and would provide standards applicable to such stowage provisions.

Ref. Proposal No. 369; § 27.1411.

2-134. By adding a sentence to the end of § 27.1415(b) to read as follows:

§ 27.1415 Ditching equipment.

(b) The storage provisions for life preservers must accommodate one life preserver for each occupant for which certification for ditching is requested.

Explanation. The proposal would require adequate storage provisions for life preservers.

Ref. Proposal No. 370; § 27.1415.

2-135. By redesignating § 27.1545(b) (2) and (3) as (b) (3) and (4), respectively, by revising § 27.1545(b) (1), and adding a new § 27.1545(b) (2), to read as follows:

§ 27.1549 [Amended]

2-136. By amending § 27.1549 in a manner substantively identical to that proposed for § 25.1549.

§ 27.1555 [Amended]

2-137. By amending § 27.1555(c) in a manner substantively identical to that proposed for § 29.1555(c).

§ 27.1557 [Amended]

2-138. By amending § 27.1557(c) in a manner substantively identical to that proposed for § 25.1557(b).

2-139. By adding a new § 27.1581(d) to read as follows:

§ 27.1581 General.

(d) *Table of contents.* Each Rotorcraft Flight Manual must include a table of contents if the complexity of the manual indicates a need for it.

Explanation. The FAA believes that a Rotorcraft Flight Manual should have a table of contents as needed to prevent undue delay in finding information. The proposed rule would require at least a determination as to the need for a table of contents. The FAA recognizes that particular Rotorcraft Flight Manuals may be of such limited scope that there is no need for a table of contents.

Ref. Proposal No. 883; § 27.1581(d).

§ 27.1545 Airspeed indicator.

(b)

(1) A red radial line—

(i) For rotorcraft other than helicopters, at V_{NE} ; and

(ii) For helicopters, at V_{NE} (power-on)

(2) A red, cross-hatched radial line at V_{NE} (power-off) for helicopters, if V_{NE} (power-off) is less than V_{NE} (power-on).

Explanation. Proposals are under consideration in the Airworthiness Review that would permit certification of helicopters having a different V_{NE} for the power-off condition than for the power-on condition. This proposed change would provide for distinctive marks at each approved V_{NE} .

Ref. Proposal No. 881, 836; § 27.1545, 27.143(e).

2-140. By revising § 27.1587(a); by striking the word "and" following the semicolon at the end of § 27.1587(b) (1); by striking the period at the end of § 27.1587(b) (2) (ii) and inserting in its place a semicolon followed by the word "and"; and by adding a new § 27.1587(b) (3) to read as follows:

§ 27.1587 Performance information.

(a) The rotorcraft must be furnished with the following information, determined in accordance with §§ 27.51 through 27.79 and § 27.143(c):

(1) Enough information to determine the limiting height-speed envelope.

(2) Information relative to—

(i) The hovering ceilings and the steady rates of climb and descent, as affected by any pertinent factors such as airspeed, temperature, and altitude; and

(ii) The maximum safe wind for operation near the ground.

(b)

(3) The horizontal takeoff distance determined in accordance with § 27.65 (a) (2) (i).

Explanation. This proposed change would clarify that the specified information need only be furnished for rotorcraft for which there is a test required that would develop the information. Also see the proposal for § 27.65 (a) (2).

Ref. Proposal Nos. 373, 833; §§ 27.1587, 27.65 (a) (2)

PART 29—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY ROTORCRAFT

2-141. By adding a new § 29.25(c) to read as follows:

§ 29.25 Weight limits.

(c) Total weight with jettisonable external load. A total weight for the rotorcraft with jettisonable external load attached that is greater than the maximum weight established under paragraph (a) of this section may be established if—

(1) The portion of the total weight that is greater than the maximum weight established under paragraph (a) of this section is made up only of the weight of all or part of the jettisonable external load; and

(2) Structural components of the rotorcraft are shown to comply with the applicable structural requirements of this part under the increased loads and stresses caused by the weight increase over that established under paragraph (a) of this section.

Explanation. See proposal for § 27.25(c).

Ref. Proposal No. 539; § 133.43(c).

2-142. By revising the lead-in of § 29.63 to read as follows:

§ 29.63 Takeoff: category B.

The horizontal distance required to take off and climb over a 50-foot obstacle must be established with the most unfavorable center of gravity. The takeoff may be begun in any manner if—

Explanation. The FAA believes this section should be updated to require the establishment of the horizontal distance required to clear a 50-foot obstacle. It would not require that there actually be such an obstacle in the flight path. There is no requirement for a flight profile to be constructed for category B helicopters.

Ref. Proposal No. 889; § 29.63.

2-143. By revising § 29.67(a) (1) (iv) and (a) (2) (iv) to read as follows:

§ 29.67 Climb: one engine inoperative.

(a) * * *

(1) * * *

(iv) The takeoff safety speed selected by the applicant; and

(2) * * *

(iv) A speed selected by the applicant; and

Explanation. This change would clarify that the speeds for compliance with the requirements of subparagraphs (a) (1) and (a) (2) may be different, and that the speed in subparagraph (a) (1) is the takeoff safety speed used in establishing the takeoff climbout path under § 29.59(c).

Ref. Proposal No. 377; § 29.67(a).

2-144. By revising § 29.71 to read as follows:

§ 29.71 Helicopter angle of glide: category B.

For each category B helicopter, except multiengine helicopters meeting the requirements of § 29.67(b), the steady angle of glide must be determined in autorotation—

(a) At the forward speed for minimum rate of descent as selected by the applicant;

(b) At the forward speed for best glide angle;

(c) At maximum weight; and

(d) At the rotor speed or speeds selected by the applicant.

Explanation. The proposed changes would update the requirement to provide for determination of specific rotor speed and forward speed for both the best glide and minimum rate of descent conditions in autorotation. In addition, the change would establish that the requirement applies only to single-engine helicopters and multiengine category B helicopters not meeting the category A engine installation requirements.

Ref. Proposal No. 379; § 29.71.

§ 29.75 [Amended]

2-145. By amending § 29.75(b) (2) by deleting the words "balked landing" and the commas preceding and following those words.

Explanation. The requirement to establish a balked landing flight path for category A rotorcraft is covered by § 29.77. The proposed change would clarify that the requirement applies only to category A rotorcraft.

Ref. Proposal No. 380; § 29.75.

§ 29.141 [Amended]

2-146. By amending § 29.141(a) in a manner substantively identical to that proposed for § 27.141(a).

§ 29.173 [Amended]

2-147. By amending § 29.173(a) in a manner substantively identical to that proposed for § 27.173(a).

2-148. By revising § 29.175(d) (2) (iv) to read as follows:

§ 29.175 Demonstration of static longitudinal stability.

(d) * * *

(2) * * *

(iv) The landing gear extended; and

Explanation. Section 29.175(d) provides for a demonstration of static longitudinal stability in the hovering condition. The proposal would revise subparagraph (2) (iv) to require the more realistic landing gear position during the demonstration.

Ref. Proposal No. 386; § 29.175(d).

2-149. By revising § 29.397, including its title, to read as follows:

§ 29.397 Limit pilot forces and torques.

(a) Except as provided in paragraph (b) of this section, the limit pilot forces are as follows:

(1) For foot controls, 130 pounds.

(2) For stick controls, 100 pounds fore and aft, and 67 pounds laterally.

(b) For flap, tab, stabilizer, rotor brake, and landing gear operating controls, the following apply:

(1) Crank, wheel, and level controls, [1+R x 50 pounds, but not less than 50

pounds nor more than 100 pounds for hand operated controls or 130 pounds for

foot operated controls, applied at any angle within 20 degrees of the plane of motion of the control. R=radius in inches.

(2) Twist controls, 133 inch-pounds.

Explanation. The proposal would provide more complete requirements for rotorcraft controls, including those often referred to as "secondary controls" which would be covered by paragraph (b). The present rules apply to all controls but the FAA has determined that a distinction between "primary" and "secondary" controls, such as is provided in the airplane parts, is justified on the basis of experience. In addition, the present requirement relating to primary wheel controls would be deleted as unnecessary.

Ref. Proposal No. 898; § 29.405.

2-150. By adding a new § 29.563 to read as follows:

§ 29.563 Structural ditching provisions.

Structural strength considerations of ditching must be in accordance with § 29.801(e).

Explanation. See the proposal for § 29.801.

Ref. Proposal No. 390; § 29.563.

2-151. By revising the lead-in of § 29.603 to read as follows:

§ 29.603 Materials.

The suitability and durability of materials used for parts, the failure of which could adversely affect safety, must—

Explanation. See the proposal for § 25.603.

Ref. Proposal No. 212; § 25.603.

§ 29.685 [Amended]

2-152. By amending § 29.685(a) by deleting the word "or" after "passengers", and by striking the period after the word "objects" and inserting a comma in its place, followed by the words "or the freezing of moisture."

Explanation. See the proposal for § 25.685.

Ref. Proposal No. 225; § 25.685.

§ 29.733 [Amended]

2-153. By amending § 29.733 in a manner substantively identical to that proposed for § 23.733.

2-154. By adding a new § 29.783(g) to read as follows:

§ 29.783 Doors.

(g) If an integral stair is installed in a passenger entry door that is qualified as a passenger emergency exit, the stair must be designed so the under the following conditions the rate of passenger emergency egress will not be impaired:

(1) The door, integral stair, and operating mechanism have been subjected to the inertia forces specified in § 29.561 (a) (3) acting separately relative to the surrounding structure.

(2) The rotorcraft is in the normal ground attitude and in each of the attitudes corresponding to collapse of one

or more legs or primary members, as applicable, of the landing gear.

Explanation. There is presently no requirement applicable to "airstair doors" in transport helicopters. Such a door has been made for one helicopter design. The proposed rule would provide a standard consistent with the one for transport airplanes that is in Part 25.

Ref. Proposal No. 905; § 29.783(g).

2-155. By adding a new § 29.787(d) to read as follows:

§ 29.787 Cargo compartments.

(d) Cargo compartment lamps must be installed so as to prevent contact between lamp bulbs and cargo.

Explanation. Continued direct contact between a hot bulb and cargo could cause a fire. A protective metal screen on the lamp could prevent such contact and also protect the bulb to some extent from damage. Hazardous damage to a lamp that could be caused by shifting cargo is required to be accounted for under present paragraph (b) of the rule.

Ref. Proposal No. 96; § 23.787(f).

2-156. By adding a new § 29.801 to read as follows:

§ 29.801 Ditching

(a) If certification with ditching provisions is requested, the rotorcraft must meet the requirements of this section and §§ 29.807(d), 29.1411 and 29.1415.

(b) Each practicable design measure, compatible with the general characteristics of the rotorcraft, must be taken to minimize the probability that in an emergency landing on water, the behavior of the rotorcraft would cause immediate injury to the occupants or would make it impossible for them to escape.

(c) The probable behavior of the rotorcraft in a water landing must be investigated by model tests or by comparison with rotorcraft of similar configuration for which the ditching characteristics are known. Scoops, flaps, projections, and any other factors likely to affect the hydrodynamic characteristics of the rotorcraft must be considered.

(d) It must be shown that, under reasonably probable water conditions, the flotation time and trim of the rotorcraft will allow the occupants to leave the rotorcraft and enter the liferafts required by 29.1415. If compliance with this provision is shown by buoyancy and trim computations, appropriate allowances must be made for probable structural damage and leakage. If the rotorcraft has fuel tanks (with fuel jettisoning provisions) that can reasonably be expected to withstand a ditching without leakage, the jettisonable volume of fuel may be considered as buoyancy volume.

(e) Unless the effects of the collapse of external doors and windows are accounted for in the investigation of the probable behavior of the rotorcraft in a water landing (as prescribed in paragraphs (c) and (d) of this section), the external doors and windows must be designed to withstand the probable maximum local pressures.

Explanation. The regulations do not fully provide for the ditching of a helicopter. Sections 29.1411, 27.1415, and 29.1415 establish equipment standards for ditching but the structural, emergency exits and flotation requirements are absent. The proposed regulation along with those proposed for §§ 27.563, 29.563, 27.801, 27.807(d), 29.807(d), 27.1411, and 27.1415 will establish the requirements for the missing parameters. The regulation proposed has been taken from § 25.801 and reworded only as necessary to accommodate the rotorcraft conditions and regulations numbering.

Ref. Proposal No. 394; § 29.801.

2-157. By redesignating § 29.807 (d) and (e) as (e) and (f) respectively, and adding a new § 29.807(d) to read as follows:

§ 29.807 Passenger emergency exits.

(d) *Ditching emergency exits for passengers.* Ditching emergency exits must be provided in accordance with the following requirements, unless the emergency exits required by paragraph (b) and (c) of this section already meet them:

(1) For rotorcraft that have a passenger seating configuration, excluding pilots seats, of nine seats or less, one exit above the waterline in each side of the rotorcraft, meeting at least the dimensions of a Type IV exit.

(2) For rotorcraft that have a passenger seating configuration, excluding pilots seats, of 10 seats or more, one exit above the waterline in a side of the rotorcraft meeting at least the dimensions of a Type III exit, for each unit (or part of a unit) of 35 passenger seats, but no less than two such exits in the passenger cabin, with one on each side of the rotorcraft. However, where it has been shown through analysis, ditching demonstrations, or any other tests found necessary by the Administrator, that the evacuation capability of the rotorcraft during ditching is improved by the use of larger exits, or by other means, the passenger seat to exit ratio may be increased.

(3) If side exits cannot be above the waterline, the side exits must be replaced by an equal number of readily accessible overhead hatches of not less than the dimensions of a Type III exit except that, for rotorcraft with a passenger configuration, excluding pilots seats, of 35 seats or less, the two required side exits need be replaced by only one overhead hatch.

Explanation. See the proposal for § 29.801. It should be noted that under the proposal ditching exits would be required whether or not ditching certification is requested.

Ref. Proposal No. 395; § 29.807 (d), (e), (f).

2-158. By adding a new § 29.813(c) to read as follows:

§ 29.813 Emergency exit access.

(c) There must be access from each aisle to each Type III and Type IV exit, and

(1) For rotorcraft that have a passenger seating configuration, excluding pilot seats, of 20 or more, the projected opening of the exit provided must not be obstructed by seats, berths, or other protrusions (including seatbacks in any position) for a distance from that exit of not less than the width of the narrowest passenger seat installed on the rotorcraft;

(2) For rotorcraft that have a passenger seating configuration, excluding pilot seats, of 19 or less, there may be minor obstructions in the region described in subparagraph (1) of this paragraph, if there are compensating factors to maintain the effectiveness of the exit.

Explanation. The accessibility requirements for Types III and IV exits should be the same for transport helicopters and airplanes. Section 25.813(c) has been used as a "guideline" for helicopter certification programs in the past. The proposed rule would establish the standards for transport helicopters.

Ref. Proposal No. 906; § 29.813(c).

§ 29.815 [Amended]

2-159. By amending the table in § 29.815 by adding an asterisk after the number "12" in the first line of the table; by striking the number "18" (incorrectly specified as "81" in the Code of Federal Regulations) in the first line of the table and inserting the number "15" in its place; and by adding a footnote to the table to read, "A narrower width not less than 9 inches may be approved when substantiated by tests found necessary by the Administrator."

Explanation. The FAA knows of no distinguishing factor that would require different aisle widths for transport category rotorcraft and airplanes. The 18 inch width would be reduced to 15 inches to be consistent with Part 25 in this regard. Similarly, a 9 inch lower limit is proposed for the reasons discussed in connection with the proposal for § 25.815.

Ref. Proposal No. 907; § 29.815.

2-160. By revising § 29.853(c) to read as follows:

§ 29.853 Compartment interiors.

(c) If smoking is to be prohibited, there must be a placard so stating, and if smoking is to be allowed—

(1) There must be an adequate number of self-contained, removable ash trays; and

(2) Where the crew compartment is separated from the passenger compartment, there must be at least one sign (using either letters or symbols) notifying all passengers when smoking is prohibited. Signs which notify when smoking is prohibited must—

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

(ii) When illuminated internally, be so constructed that the crew can turn them on and off;

Explanation. See the proposal for § 23.853(c).

Ref. Proposal No. 911; § 29.853.

2-161. By adding a new center heading a new § 29.865 following § 29.863 to read as follows:

EXTERNAL LOAD ATTACHING MEANS

§ 29.865 External load attaching means.

(a) It must be shown by analysis or test, or both, that the rotorcraft external-load attaching means can withstand a limit static load equal to 2.5 times the maximum external load for which authorization is requested, applied in the vertical direction and in any direction making an angle of 30 degrees with the vertical, except for those directions having a forward component. However, the 30-degree angle may be reduced to a lesser angle if an operating limitation is established limiting external load operations to such angles for which compliance with this paragraph has been shown.

(b) The external load attaching means for Class B and Class C rotorcraft-load combinations must include a device to enable the pilot to release the external load quickly during flight. This quick-release device, and the means by which it is controlled, must comply with the following:

(1) A control for the quick-release device must be installed on one of the pilot's primary controls and must be designed and located so that it may be operated by the pilot without hazardously limiting his ability to control the rotorcraft during an emergency situation.

(2) In addition a manual mechanical control for the quick-release device, readily accessible either to the pilot or to another crew member, must be provided.

(3) The quick-release device must function properly with all external loads up to and including the maximum external load for which authorization is requested.

(c) A placard or marking must be installed next to the external-load attaching means stating the maximum authorized external load as demonstrated under § 29.25 and this section.

Explanation. The proposal for § 27.865 and § 29.865 are intended to remove certain airworthiness requirements from § 133.43 and place them in Parts 27 and 29 with certain additions and clarifications. The proposal, if adopted, would provide for the approval of external load operations at weights greater than the maximum weight. See also the proposal for § 27.25.

Ref. Proposal No. 848; § 27.865.

§ 29.903 [Amended]

2-162. By amending § 29.903 in a manner substantively identical to that proposed for § 23.903, and revising § 29.903 (c) (1) to read as follows:

(c)

(1) Each component of the engine stopping system that is located on the

engine side of the firewall, and that might be exposed to fire, must be at least fire resistant; or

Explanation. The current rule contains a requirement that engine controls, including those that are not a part of the engine stopping system, must be fire resistant. However, the need for engine controls other than stopping controls after an engine fire is questionable. The proposal would delete from the requirement coverage of engine controls other than stopping controls. It should be noted that the option of providing duplicate controls would be retained under the proposal. Also, see the proposal for § 23.903.

Ref. Proposal No. 919; § 29.903(c).

2-163. By revising the second sentence of § 29.917(a) to read as follows:

§ 29.917 Design.

(a) * * *. This includes gear boxes, shafting, universal joints, couplings, rotor brake assemblies, clutches, supporting bearings for shafting, any attendant accessory pads or drives, and any cooling fans that are a part of, attached to, or mounted on the rotor drive system.

Explanation. The proposal would revise § 29.917(a) to contain a positive description of those cooling fans to be considered as a part of the rotor drive system.

Ref. Proposal No. 921; § 29.917.

§ 29.927 [Amended]

2-164. By amending § 29.927(b) (2) in a manner substantively identical to that proposed for § 27.927(b) (2).

2-165. By revising § 29.931 to read as follows:

§ 29.931 Shafting critical speed.

(a) The critical speeds of any shafting must be determined by demonstration except that analytical methods may be used if reliable methods of analysis are available for the particular design.

(b) If any critical speed lies within, or close to, the operating ranges for idling, power-on, and autorotative conditions, the stresses occurring at that speed must be within safe limits. This must be shown by tests.

(c) If analytical methods are used and show that no critical speed lies within the permissible operating ranges, the margins between the calculated critical speeds and the limits of the allowable operating ranges must be adequate to allow for possible variations between the computed and actual values.

Explanation. This proposal is identical to the critical speeds requirements of § 27.931. Part 27 contains a more comprehensive and realistic requirement.

Ref. Proposal No. 926; § 29.931.

2-166. By adding a new § 29.939(c) to read as follows:

§ 29.939 Turbine engine operating characteristics.

(c) For governor-controlled engines, it must be shown that there exists no hazardous torsional instability of the drive system associated with critical combinations of power, rotational speed, and control displacement.

Explanation. Helicopter drive systems usually exhibit a first order torsional oscillatory mode at from three to seven c.p.s. The governor in the fuel control will have a response rate on the order of one-third to one-seventh second, thus causing fuel flow and the corresponding engine torque to excite the first or possibly the second order natural torsional mode of the helicopter drive system. When this occurs, it can be detected early in the manufacturer's development program, and design changes to achieve a satisfactory condition can then be made. The proposal would require that it be shown that no hazardous torsional instability exists.

Ref. Proposal No. 927; § 29.939(c).

§ 29.951 [Amended]

2-167. By amending § 29.951(a) in a manner substantively identical to that proposed for § 25.951(a).

§ 29.977 [Amended]

2-168. By amending § 29.977 in a manner substantively identical to that proposed for § 23.977.

§ 29.979 [Amended]

2-169. By adding new §§ 29.979 (d) and (e) that would be substantively identical to the proposed new §§ 25.979 (d) and (e).

§ 29.999 [Amended]

2-170. By amending § 29.999(b) in a manner substantively identical to that proposed for § 25.999(b).

§ 29.1041 [Amended]

2-171. By amending § 29.1041(a) in a manner substantively identical to that proposed for § 25.1041.

2-172. By revising § 29.1043(c) to read as follows:

§ 29.1043 Cooling tests.

(c) Correction factor (except cylinder barrels). Unless a more rational correction applies, temperatures of engine fluids and power-plant components (except cylinder barrels) for which temperature limits are established, must be corrected by adding to them the difference between the maximum ambient atmospheric temperature and the temperature of the ambient air at the time of the first occurrence of the maximum component or fluid temperature recorded during the cooling test.

Explanation. See the proposal for § 27.1043(c).

Ref. Proposal No. 933; § 29.1043(e).

§ 29.1093 [Amended]

2-173. By amending § 29.1093 in a manner substantively identical to that proposed for § 23.1093.

§ 29.1125 [Amended]

2-174. By amending § 29.1125 in manner substantively identical to that proposed for §§ 23.1125 and 25.1125.

§ 29.1143 [Amended]

2-175. By amending § 29.1143 in a manner substantively identical to that proposed for § 23.1143(e), and by amending paragraph (d) by striking the words "antidetant injection" in the first and second sentences and inserting in place thereof, in the first sentence, the words "fluid injection (other than fuel)" and, in the second sentence, the words "injection system".

Explanation. See the proposals for §§ 23.1143(e) and 25.1143.

Ref. Proposals Nos. 663, 767; §§ 23-1143, 25. 1143.

§ 29.1165 [Amended]

2-176. By amending § 29.1165(f) in a manner substantively identical to that proposed for § 23.1165(e).

§ 29.1167 [New]

2-177. By adding a new § 29.1167 that would be substantively identical to the proposed new § 25.1167.

2-178. By revising § 29.1189(a) to read as follows:

§ 29.1189 Shutoff means.

(a) There must be means to shut off or otherwise prevent hazardous quantities of fuel, oil, de-icing fluid, and other flammable fluids from flowing into, within, or through any designated fire zone, except that this means need not be provided—

(1) For lines and fittings forming an integral part of an engine;

(2) For oil systems for turbine engine installations in which all external components of the oil system, including oil tanks, are fireproof; or

(3) For engine oil systems in category B rotorcraft using reciprocating engines of less than 500 cubic inches displacement.

Explanation. Section 29.1189(a) requires flammable fluid shutoff means. However, under § 25.1189 turbine-powered airplanes have been certificated without a shutoff means for their oil system. The service experience of these airplanes has shown that oil shutoff means are not essential for turbines and the proposal would relax the requirement for oil shutoff means on turbine engine installations in rotorcraft certificated under Part 29.

Ref. Proposal No. 942; § 29.1189(a).

§ 29.1197 [Amended]

2-179. By amending § 29.1197(a) in a manner substantively identical to that proposed for § 25.1197(a).

§ 29.1303 [Amended]

2-180. By amending § 29.1303(d) in a manner substantively identical to that proposed for § 25.1303(a)(2).

2-181. By revising § 29.1307 to read as follows:

§ 29.1307 Miscellaneous equipment.

The following is required miscellaneous equipment:

(a) An approved seat for each occupant.

(b) A master switch arrangement for electrical circuits other than ignition.

(c) Hand fire extinguishers.

(d) A windshield wiper or equivalent device for each pilot station.

(e) A two-way radio communication system.

Explanation. The proposal would eliminate requirements already covered by other provisions in Part 29.

Ref. Proposal No. 403; § 29.1307.

2-182. By revising § 29.1322 to read as follows:

§ 29.1322 Warning, caution, and advisory lights.

If warning, caution or advisory lights are installed they must, unless otherwise approved by the Administrator, be—

(a) Red, for warning lights (lights indicating a hazard which may require immediate corrective action);

(b) Amber, for caution lights (lights indicating the possible need for future corrective action);

(c) Green, for safe operation lights;

(d) Blue, for position indication, agreement, and correct response lights; and

(e) Any other color, including white, for lights not described in paragraphs (a) through (d) of this section, provided the color differs sufficiently from the colors prescribed in paragraphs (a) through (d) of this section to avoid possible confusion.

Explanation. See the proposal for § 23.1322.

Ref. Proposal No. 951; § 29.1322.

§ 29.1325 [Amended]

2-183. By adding a new § 29.1325(f) that would be substantively identical to the proposed new § 23.1325(c).

§ 29.1329 [Amended]

2-184. By amending § 29.1329(a)(1) in a manner substantively identical to that proposed for § 27.1329(a)(1).

§ 29.1337 [Amended]

2-185. By amending § 29.1337(a) in a manner substantively identical to that proposed for § 25.1337(a).

2-186. By adding a new § 29.1353(c)(5) to read as follows:

§ 29.1353 Electrical equipment and installation.

(c) * * *
(5) Nickel cadmium battery installations capable of being used to start an

engine or auxiliary power unit must have—

(i) A system to control the charging rate of the battery automatically so as to prevent battery overheating;

(ii) A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or

(iii) A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of battery failure. If compliance is shown with subparagraph (ii) or (iii) of this paragraph the operating procedures for disconnecting the battery from its charging source must be established and included in the Rotorcraft Flight Manual.

Explanation. See the proposal for § 23.1353(f).

Ref. Proposal No. 955; § 29.1353(c)(5).

§ 29.1385 [Amended]

2-187. By amending § 29.1385 in a manner substantively identical to that proposed for § 25.1385.

2-188. By redesignating § 29.1545(b)(2) and (3) as (b)(3) and (4), respectively, by revising § 29.1545(b)(1), and adding a new § 29.1545(b)(2), to read as follows:

§ 29.1545 Airspeed indicator.

* * *
(b) * * *
(1) red radial line—(i) For rotorcraft other than helicopters, at V_{NE} ; and (ii) For helicopters, at V_{NE} (power-on).
(2) A red, cross-hatched radial line at V_{NO} (power-off) for helicopters, if V_{NO} (power-off) is less than V_{NE} (power-on). each approved V_{NE} .

Explanation. Proposals are under consideration in the Airworthiness Review that would permit certification of helicopters having a different V_{NE} for the power-off condition than for the power-on condition. This proposed change would provide for distinctive marks at
Ref. Proposal Nos. 967; § 29.1545(b)(4).

§ 29.1549 [Amended]

2-189. By amending § 29.1549 in a manner substantively identical to that proposed for § 25.1549.

2-190. By revising § 29.1555(c) to read as follows:

§ 29.1555 Control markings.

* * *
(c) Usable fuel capacity must be marked as follows:

(1) For fuel systems having no selector controls, the usable fuel capacity of the system must be indicated at the fuel quantity indicator.

(2) For fuel systems having selector controls, the usable fuel capacity available at each selector control position

must be indicated near the selector control.

Explanation. The FAA believes that the proposed rule would provide for more relevant information than the present rule.

Ref. Proposal No. 968; § 29.1555(c).

§ 29.1557 [Amended]

2-191. By amending § 29.1557(c) in a manner substantively identical to that proposed for § 25.1557(b).

2-192. By adding a new § 29.1581(d) to read as follows:

§ 29.1581 General.

(d) *Table of contents.* Each Rotorcraft Flight Manual must include a table of contents if the complexity of the manual indicates a need for it.

Explanation. The FAA believes that a Rotorcraft Flight Manual should have a table of contents as needed to prevent undue delay in finding information. The proposed rule would require at least a determination as to the need for a table of contents. The FAA recognizes that particular Rotorcraft Flight Manuals may be of such limited scope that there is no need for a table of contents.

Ref. Proposal No. 970; § 29.1581(d).

PART 31—AIRWORTHINESS STANDARDS: MANNED FREE BALLOONS

2-193. By revising § 31.1(a), redesignating § 31.1(b) as § 31.1(c), and adding a new § 31.1(b) to read as follows:

§ 31.1 Applicability.

(a) This part prescribes airworthiness standards for the issue of type certificates and changes to those certificates, for manned free balloons.

(b) Each person who applies under Part 21 for such a certificate or change must show compliance with the applicable requirements of this part.

Explanation. The proposal would revise the applicability section to be consistent with those of Parts 23, 25, 27, and 29.

Ref. Proposal No. 426; § 35.1.

§ 31.11 [Reserved]

§ 31.20 [New]

2-194. By redesignating § 31.11 as § 31.20 in Subpart B of Part 31 and by marking § 31.11 "[Reserved]".

Explanation. The proposed renumbering of current § 31.11 is necessary to provide for the addition of other proposed flight requirements that would be more appropriately placed prior to current § 31.11.

Ref. Proposal No. 980; § 31.20.

2-195. By adding a new § 31.14 to read as follows:

§ 31.14 Weight limits.

(a) The range of weights over which the balloon may be safely operated must be established.

(b) *Maximum weight.* The maximum weight is the highest weight at which compliance with each applicable requirement of this part is shown. The maximum weight must be established so that it is not more than—

(i) The highest weight selected by the applicant;

(ii) The design maximum weight which is the highest weight at which compliance with each applicable structural loading condition of this part is shown; or

(iii) The highest weight at which compliance with each applicable flight requirement of this part is shown.

(c) The information established under paragraphs (a) and (b) of this section must be made available to the pilot in accordance with § 31.81 of this part.

Explanation. This proposal would require the establishment of maximum weights, and the range of weights for safe operation. The FAA believes such information should be made available to the balloon pilot.

Ref. Proposal Nos. 978, 977; §§ 31.14, 31.13.

2-196. By revising § 31.45 to read as follows:

§ 31.45 Fuel cells.

If fuel cells are used, the fuel cells, their attachments, and related supporting structure must be shown by tests to be capable of withstanding, without detrimental distortion or failure, any inertia loads to which the installation may be subjected, including the drop tests prescribed in § 31.27(c). In the tests, the fuel cells must be loaded to the weight and pressure equivalent to the full fuel quantity condition.

Explanation. While § 31.45 contains general standards pertaining to inertia loads which fuel cells must be able to withstand, that section does not provide specific requirements for fuel cell weight and pressure conditions applicable to the tests. The FAA believes that the fuel cells should be fully loaded and pressurized in order that the tests may be realistic and meaningful. The proposal would amend § 31.45 accordingly. In this connection, since it is possible for the fuel cell, its attachments, and supporting structure to become unsafely distorted and yet not fail, the proposal would also require them to be able to withstand the tests without detrimental distortion. Also see proposed § 31.46.

Ref. Proposal No. 983; § 31.45.

2-197. By adding a new § 31.46 to read as follows:

§ 31.46 Pressurized fuel systems.

For pressurized fuel systems, each element and its connecting fittings and lines must be tested to an ultimate pressure of at least twice the maximum pressure to which the system will be subjected in normal operation. No part of the system may fail or malfunction during the test. The test configuration must be representative of the normal fuel system installation and balloon configuration.

Explanation. In order to distinguish inertia tests and fuel pressure tests, it is proposed to transfer the specialized requirements covering pressurized fuel systems from § 31.45 to a new § 31.46. The new § 31.46 would further clarify test configuration by requiring that it be representative of the normal balloon installation and by making it clear that fuel lines are components that must be pressure tested.

Ref. Proposal No. 985; § 31.46.

2-198. By designating the current language of § 31.63 as § 31.63(a) and by adding a new § 31.63(b) to read as follows:

§ 31.63 Safety belts.

(a)

(b) This section does not apply to balloons that incorporate a basket or gondola.

Explanation. The proposal would delete the requirement for occupant restraints for basket or gondola equipped balloons. The use of a safety belt in a basket or gondola equipped balloon could hinder the pilot in his control of the aircraft.

Ref. Proposal No. 415; § 31.63.

2-199. By deleting § 31.85(a)(1) and marking it "[Reserved]" and by adding a new § 31.85(c) to read as follows:

§ 31.85 Required basic equipment.

(a)

(c) For captive gas balloons, a compass.

Explanation. The compass serves a useful purpose in gas balloons where traveling great distances is possible and typical. In hot air balloons where flight distances are rarely great, the compass serves no practical purpose. The proposal would delete the requirement that hot air balloons be equipped with compasses.

Ref. Proposal No. 416; § 31.85(a)(1).

PART 33—AIRWORTHINESS STANDARDS: AIRCRAFT ENGINES

2-200. By revising § 33.1 to read as follows:

§ 33.1 Applicability.

(a) This part prescribes airworthiness standards for the issue of type certificates and changes to those certificates, for aircraft engines.

(b) Each person who applies under Part 21 for such a certificate or change must show compliance with the applicable requirements of this part.

Explanation. See the proposal for § 31.1.

Ref. Proposal No. 426; § 35.1.

PART 35—AIRWORTHINESS STANDARDS: PROPELLERS

2-201. By revising § 35.1 to read as follows:

§ 35.1 Applicability.

(a) This part prescribes airworthiness standards for the issue of type cer-

tificates and changes to those certificates, for propellers.

(b) Each person who applies under Part 21 for such a certificate or change must show compliance with the applicable requirements of this part.

Explanation. See the proposal for § 31.1.

Ref. Proposal No. 426; § 35.1.

2-202. By revising the first sentence of § 35.39(c) (1) to read as follows:

§ 35.39 Endurance test.

(c) * * *

(1) A 100-hour test on a representative engine with the same or higher power and rotational speed and the same or more severe vibration characteristics as the engine with which the propeller is to be used.

Explanation. The proposal would permit, during the propeller test specified, the use of engines with higher powers and rotational speeds than the engine with which the propeller would be used. The proposal, however, would require that the engine be representative of the engine on which the propeller is to be used and that the engine have the same or more severe vibrational characteristics.

Ref. Proposal No. 437; § 35.39(c) (1).

2-203. By revising § 35.41(e) to read as follows:

§ 35.41 Functional tests.

(e) *Reversible-pitch propellers.*

Two hundred complete cycles of control must be made from lowest normal pitch to maximum reverse pitch, and, while in maximum reverse pitch, during each cycle, the propeller must be run for 30 seconds at the maximum power and rotational speed selected by the applicant for maximum reverse pitch.

Explanation. Section 35.41(e) covers functional tests for reversible-pitch propellers. It should, but does not, cover operation while in reverse pitch. The proposal conforms to industry practice and updates the section to the state-of-the-art.

Ref. Proposal No. 438; § 35.41(e).

2-204. By revising § 35.45(a) to read as follows:

§ 35.45 Teardown inspection.

(a) After completion of the tests prescribed in this subpart, the propeller must be completely disassembled and a detailed inspection must be made of the propeller parts for cracks, wear, distortion, and any other unusual conditions.

Explanation. The proposal would delete the requirement for an inspection for fatigue, which is a cause and not evidence of a propeller failure, and would instead provide for inspection for cracks, wear, distortion, and other unusual conditions.

Ref. Proposal No. 439; § 35.45(a).

PART 91—GENERAL OPERATING AND FLIGHT RULES

§ 91.14 [Amended]

2-205. By amending the parenthetical expressions contained in §§ 91.14(a) (1) and (a) (2) to read "(except free balloons that incorporate baskets or gondolas and airships)."

Explanation. See the proposed revision to § 31.63.

Ref. Proposal No. 485; § 91.14(a).

§ 91.21 [Amended]

2-206. By inserting the parenthetical expression "(except a manned free balloon)" between the words "aircraft" and "that" in § 91.21(a).

Explanation. The proposal would delete the requirement for dual controls in manned free balloons used for flight instruction since controls in free balloons are accessible to each occupant.

Ref. Proposal No. 486; § 91.21(a).

2-207. By revising § 91.33(d) (6) to read as follows:

§ 91.33 Powered civil aircraft with standard category U.S. airworthiness certificates; instrument and equipment requirements.

(d) * * *

(6) Clock (sweep second pointer or digital reading in hours, minutes, and seconds).

Explanation. The requirement for a clock with a sweep second hand is not consistent with the state of the art. The proposal provides for the use of digital clocks.

Ref. Proposal No. 493; § 91.33(d) (6).

2-208. By adding a new § 91.193(g) to read as follows:

§ 91.193 Emergency equipment.

(g) If the airplane incorporates a class A, B, or E cargo compartment, protective breathing equipment that complies with the requirements of § 25.1439 (b) of this chapter must be installed for the use of appropriate crewmembers.

Explanation. The proposal would require that certain airplanes operated under Part 91 Subpart D have installed protective breathing equipment that meet the requirements of § 25.1439. The proposal is a result of recent accident investigations.

Ref. Proposal No. 321; § 25.1439.

2-209. By deleting § 91.209(c) and marking it "[Reserved]" and by revising the lead-in of § 91.209(b) and § 91.209 (b) (1) to read as follows:

§ 91.209 Operating in icing conditions.

(b) Except for an airplane that is type certificated for operation into known or forecast icing conditions, no person may fly—

(1) Into known or forecast severe icing conditions or, under IFR, into known or forecast moderate icing conditions; or

Explanation. The proposal would update the section to provide for those airplanes approved for operations in icing conditions under type certification provisions other than those presently referenced in § 91.209 (b) and (c).

Ref. Proposal No. 1019; § 91.209(b) (2).

PART 121—CERTIFICATION AND OPERATIONS: DOMESTIC, FLAG, AND SUPPLEMENTAL AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT

2-210. By revising § 121.171(b) to read as follows:

§ 121.171 Applicability.

(b) For purposes of this part, "effective length of the runway" for landing means the distance from the point at which the obstruction clearance plane associated with the approach end of the runway intersects the centerline of the runway to the far end thereof.

2-211. By deleting the word "and" at the end of § 121.199(b) (3), by inserting a semicolon and the word "and" at the end of § 121.199(b) (4), and by adding a new § 121.199(b) (5) to read as follows:

§ 121.199 Nontransport category airplanes: takeoff limitations.

(b) * * *

(5) The "effective length of the runway" for takeoff means the distance from the end of the runway at which the takeoff is started to a point at which the obstruction clearance plane associated with the other end of the runway intersects the runway centerline.

Explanation. The phrase "effective length of runway" for takeoff has no place of application in Part 121 except in § 121.199. The fact that a definition for that phrase exists in § 121.171 (b) and is applicable for purposes of all of Part 121 has caused confusion in the past. The proposal would remove the definition from § 121.171 (b) and place it in § 121.199 as clearly applicable only to that section.

Ref. Proposal No. 515; § 121.171.

§ 121.331 [Amended]

§ 121.333 [Amended]

2-212. By inserting between the first and second sentences of §§ 121.331 (b) and 121.333 (b), a sentence that reads—"The required two hours supply is that quantity of oxygen necessary for a constant rate of descent from the airplane's maximum certificated operating altitude to 10,000 feet in ten minutes and followed by 110 minutes at 10,000 feet."

Explanation. The proposal would clarify the required oxygen quantities.

Ref. Proposal Nos. 530, 531; §§ 121.331 (b), 121.333 (b).

2-213. By adding a new § 121.337(d) to read as follows:

PROPOSED RULES

§ 121.337 Protective breathing equipment for the flight crew.

(d) If the airplane incorporates a class A, B, or E cargo compartment, protective breathing equipment, that complies with the requirements of § 25.1439 (b) of this chapter must be installed for the use of appropriate crewmembers.

Explanation. The proposal would require that certain airplanes operated under Part 121 have installed protective breathing equipment that meets the requirements of § 25.1439(b). The proposal arises from the results or recent accident investigations.

Ref. Proposal No. 321; § 25.1439.

PART 127—CERTIFICATION AND OPERATIONS OF SCHEDULED AIR CARRIERS WITH HELICOPTERS

2-214. By revising the title and introductory language of § 127.105 to read as follows:

§ 127.105 Engine instruments and equipment—reciprocating engine powered helicopters.

No person may operate a reciprocating engine powered helicopter unless it is equipped with the following engine instruments and equipment:

2-215. By adding a new § 127.106 to read as follows:

§ 127.106 Engine instruments and equipment—turbine engine powered helicopters.

No person may operate a turbine engine powered helicopter unless it is equipped with the following engine instruments and equipment:

(a) A fuel pressure indicator and warning light for each engine.

(b) A means of indicating fuel quantity in each fuel tank to be used, and for helicopters with more than one fuel tank, a warning device indicating when the fuel in any independent fuel tank is low.

(c) An oil pressure indicator and warning light for each engine.

(d) An oil temperature indicator for each engine.

(e) An oil temperature indicator and warning light for each main rotor drive gearbox including those gearboxes essential to rotor phasing, having an oil system independent of the engine oil system.

(f) An oil temperature indicator and warning light for each transmission using a separate oil pump.

(g) A gas temperature indicator for each engine.

(h) An output torque indicator for each engine.

(i) A tachometer (to indicate the speed of the engine rotors with established limiting speeds) for each engine.

(j) A tachometer for the main rotor or for each main rotor the speed of which may vary appreciably with respect to another main rotor.

The tachometers required by paragraphs (i) and (j) of this section may be

combined in a single instrument, but that instrument must indicate rotor RPM during autorotation.

Explanation. The proposal would provide engine instrument and equipment requirements appropriate for turbine powered helicopters used in Part 127 operations.

Ref. Proposal No. 1098; § 127.106.

PART 133—ROTORCRAFT EXTERNAL-LOAD OPERATIONS

2-216. By revising § 133.1 to read as follows:

§ 133.1 Applicability.

This part prescribes operating and certification rules governing the conduct of nonpassenger-carrying rotorcraft external-load operations in the United States by any person (other than as an air carrier) conducting such an operation for compensation or hire. However, this Part does not apply to operations conducted under Part 375 of this Title.

Explanation. The purpose of this proposal and the related proposals affecting §§ 27.25, 29.25, 27.865, 29.865, 133.41, 133.43, and § 133.45(c) is to remove certain airworthiness requirements from Part 133 and to place those requirements in Parts 27 and 29.

Ref. Proposal No. 1099; § 133.1.

§ 133.41 [Amended]

2-217. By deleting the reference to § 133.43(d) (1) and (2) in § 133.41(c) (6) and inserting in its place a reference to § 133.43(a).

Explanation. See the proposal for § 133.1.

Ref. Proposal No. 1101; § 133.45.

2-218. By revising § 133.43 to read as follows:

§ 133.43 Structure and design.

(a) *External-load attaching means and quick release devices.* Unless approved on or before January 17, 1964, under Part 8 of the Civil Air Regulations, each external-load attaching means must have been approved under Part 27 or 29 of this chapter. Each quick release device must meet the applicable requirements of Part 27 or 29 of this chapter.

(b) [Reserved]

(c) *Weight and center of gravity—(1) Weight.* The total weight of the rotorcraft-load combination must not exceed the total weight approved for the rotorcraft during its type certification under Part 27 or 29 of this chapter.

(2) *Center of gravity.* The location of the center of gravity must, for all loading conditions, be within the range established for the rotorcraft during its type certification under Part 27 or 29 of this chapter. For Class C rotorcraft-load combinations, the magnitude and direction of the loading force must be established at those values for which the effective location of the center of gravity remains within its established range.

Explanation. See the proposals for §§ 27.25, 29.25, 27.865, 29.865, and 133.1.

Ref. Proposal Nos. 539, 1100; §§ 133.43(c), 133.43.

§ 133.45 [Amended]

2-219. By deleting the words "(a) and (d) (3)" from § 133.45(c).

Explanation. See the proposal for § 133.1.

Ref. Proposal No. 1101; § 133.45.

PART 135—AIR TAXI OPERATORS AND COMMERCIAL OPERATORS OF SMALL AIRCRAFT

2-220. By revising § 135.71(a) (5) to read as follows:

§ 135.71 Operating information required.

(a) * * *

(5) In the case of multiengine aircraft, one-engine-inoperative climb performance data, and if the aircraft is approved for use in IFR or over the top operations, that data must be sufficient to enable the pilot to determine compliance with § 135.145(a) (2).

Explanation. One-engine-inoperative climb performance data furnished by the operator, for some airplanes, is insufficient to enable pilots planning IFR passenger flights to compute a maximum takeoff weight that will comply with § 135.145(a) (2) which requires limitations on weight to provide for a specified en route climb performance. This proposal would require sufficient data to determine compliance with that section to be made available to the pilots.

Ref. Proposal No. 1103; § 135.71(a) (5).

2-221. By revising § 135.165(b) (2) to read as follows:

§ 135.165 Oxygen equipment requirements.

(b) * * *

(2) Above 15,000 feet MSL, oxygen to each occupant of the aircraft, except the pilots, for 1 hour unless, at all times during flight above that altitude, the aircraft can safely descend to 15,000 feet MSL within 4 minutes, in which case—

(i) For small airplanes type certificated in the transport category, a 10-minute supply is required; and,

(ii) For other airplanes, a 30-minute supply is required.

Explanation. The proposal would update the current provision to provide an oxygen supply requirement for transport category airplanes operated under Part 135, similar to the requirement contained in Part 121, applicable to such airplanes.

Ref. Proposal No. 554; § 135.165(b) (3).

APPENDIX I—"ITEMS FOR NOTICE" FROM THE "PROPOSALS NOT IN AGENDA" WORKBOOK NOT INCLUDED IN THIS NOTICE

The Committees referred to in this appendix were convened at the First Biennial Airworthiness Review Conference during December 2-11, 1974. They are identified as follows: Committee I (Procedures and Special Issues); Committee II (Flight); Committee

III-1 (Airframe, Large Airplanes); Committee III-2 (Airframe, Small Airplanes and Rotorcraft); Committee IV (Powerplant); and Committee V (Equipment and Systems).

| Proposal No. | 14 CFR | Remarks |
|--------------|-------------------|--|
| 48 | 21.329 | Discussed in committee I. |
| 49 | 21.329(e) | Do. |
| 51 | 21.331 | Do. |
| 52 | 21.331(a) | Do. |
| 648 | 23.991(d) | Held for further study. |
| 664 | 23.1145(d) | Held pending review of discussions on the proposals on secs. 23.1145(d), 27.1145(c), and 29.1145(d) discussed in committee IV. |
| 701 | 23.1436(a) | Discussed in committee V. |
| 129 | 23.1545(a) | Do. |
| 717 | 23.1587(c) | Discussed in committee II. |
| 171 | 25.149(e) | Do. |
| 1043 | 25.253 | Do. |
| 182 | 25.265 | Discussed in committee IV. |
| 256 | 25.851 | Held pending action on committee 111-1 proposal 731 (sec. 25.853). |
| 269 | 25.934 | Discussed in committee IV. |
| 771 | 25.1167 | Discussed in committee V. |
| 810 | 25.1436 | Do. |
| 869 | 27.1337(b) | Held pending review of discussions on proposal No. 117, sec. 23.1337(b)(1), in committee IV. |
| 387 | 29.351 | Held for further study. |
| 995 | 29.1091(e) | Held pending review of discussions in committee IV on similar proposals for pts. 23, 25, and 27. |
| 989 | 31.81 | Held pending review of discussions in committee I on proposals relating to manned free balloons. |
| 1097 | Pt. 127 subpt. H. | Discussed in committee IV. |
| 552 | 135.153 | Discussed in committee V. |
| 1104 | 135.159 | Do. |

APPENDIX II—"ITEMS FOR NOTICE" FROM THE "PROPOSALS NOT IN AGENDA WORKBOOK" REMOVED FROM THE FIRST BIENNIAL AIRWORTHINESS REVIEW

(1) Proposals Nos. 572 and 574; §§ 21.111 and 21.119(d). The FAA has determined, after further review, that these proposals do not fully attain the objective desired. They have

been withdrawn for additional and may be included in a subsequent Biennial Airworthiness Review Program.

(2) Proposals Nos. 730, 745, and 776; §§ 25.851(b)(3), 25.953(a), and 25.1197(b). The FAA has determined, after further review, that these proposals do not warrant regulatory action at this time. They may be included in a subsequent Biennial Airworthiness Review Program.

(3) Proposal No. 39; § 21.303. The proposal to develop a standard form for Parts Manufacturer Approval applications and to reference that form in § 21.303 is in appropriate as a proposed rule change. Section 21.303(c) describes the information that must be furnished in any application for a Parts Manufacturer Approval and also specifies where that application must be filed. Any application containing that information that is forwarded to the designated location is acceptable.

(4) Proposal No. 491; § 91.33(b). The proposal to expressly except manned free balloons from the requirements of § 91.33(b)(12) is inappropriate as a rule change. Section 91.33 applies only to powered aircraft, and manned free balloons are not powered aircraft.

(5) Proposal No. 1014; § 91.73. Withdrawn for further study by FAA's Air Traffic Service. If rulemaking is deemed appropriate, a separate notice will be issued.

(6) Proposal No. 787; § 25.1307(i). Withdrawn pending separate rulemaking to update Appendix G, Part 121. Corresponding airworthiness standards will be proposed as part of that rulemaking.

R. P. SKULLY,
Director,
Flight Standards Service.

Issued in Washington, D.C., on February 27, 1975.

[FR Doc.75-5731 Filed 3-6-75; 8:45 am]