Advance copy pending issuance of Changes to FAR Parts 11, 21, 33, and 35

Title 14—AERONAUTICS AND SPACE

Chapter I—Federal Aviation Agency

[Docket No. 7139; Amdt. 1-11, 21-15, 33-3, 35-2]

POWERPLANT DESIGN REQUIREMENTS FOR AIRCRAFT ENGINES AND PROPELLERS

This amendment adds miscellaneous powerplant design requirements for aircraft engines and propellers, and withdraws certain proposals for rotorcraft. This amendment is based on, and reflects industry comments concerning, notice of proposed rule making 66-3, published in the FEDERAL REGISTER (31 F.R. 2485) on February 8, 1966. Except as modified by the following discussion, the reasons for this amendment are those in the notice. Changes from the notice, and Agency disposition of industry comments, are as follows:

Part 1—Definitions and Abbreviations: Definitions of "rated takeoff power" and "rated takeoff thrust" were proposed. One comment suggested adding further details to clarify the definitions. The Agency does not agree that the recommended clarifications are necessary. One comment recommended amending the definitions of "2½-minute power" and "30-minute power" to obtain conformity with the definitions of "rated takeoff power" and "rated takeoff thrust." This suggestion has merit and is being considered for a future notice of proposed rule making. No other adverse comments having been received, the definitions are drafted as proposed, except that the words "maximum brake horsepower * * * developed" are replaced with the words "approved brake horsepower developed" since the words "maximum * * * developed" could imply that the power rating is set at the maximum (or highest) power developed by any engine using the appropriate limiting parameters, contrary to new § 33.8. Amended definitions of "maximum continuous power" and "maximum continuous thrust" were proposed. One comment recommended adding further details to clarify the amended definitions. The Agency does not agree that the recommended clarifications are necessary. One comment stated that the amended definitions should include the word "rated" for consistency with the new takeoff power and thrust definitions. The Agency agrees. The amended definitions are so drafted. In addition, and for the same reason, the word "rated" is added to the terms "2½-minute power" and "30-minute power" in the definitions thereof.

Part 21—Certification procedures for Products and Parts: As proposed in the notice, Part 21 is amended to make editorial changes consistent with the new definitions of engine power or thrust values in terms of "ratings." No substantive change results. The notice proposed to delete § 33.13 and § 35.15

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since § 21.21 contains similar general language concerning unsafe features of engines and propellers. One comment objected, stating that repetition may be beneficial in this case. The Agency disagrees. Experience has shown that repetition of legal requirements can lead to misunderstanding and uncertainty on the part of the users of the regulations. Other comments stated that §§ 33.13 and 35.15 should not be deleted because type certification standards (as opposed to procedural requirements) should be located together in one document for each product (Parts 33 and 35, respectively), and that §§ 33.13 and 35.15 also contain testing requirements not in § 21.21. The Agency agrees. This amendment therefore accomplishes the intent of the notice by eliminating the surplus requirement with respect to engines and propellers in § 21.21 rather than by deleting the similar provision in Parts 33 and 35.

Parts 27 and 29—Rotorcraft Airworthiness Standards (Withdrawal): The notice proposed to amend Parts 27 and 29 to provide, for single engine, turbine engine powered helicopters, an exception to the general requirement (resulting from the requirement to have an engine that is type certificated under Part 33) that the engine must have two secondary circuits and igniters. Comments were received that indicate that the relationship between ignition and relight failures on turbine engines has historically been such that the requirement for two igniters and two separate secondary electric circuits may be an unnecessary burden for turbine engine powered aircraft other than single engine helicopters. These comments appear to have merit. The proposed amendments to Parts 27 and 29 are therefore withdrawn pending further study of these comments, which, if substantiated, would lead to new notice procedures for amendment of Part 33 rather than of individual aircraft airworthiness requirements.

Part 33—Airworthiness Standards: Aircraft Engines: Consistent with the proposed new definitions of "rated takeoff power" and "rated takeoff thrust," the notice proposed to amend Part 33 to use those terms in place of the terms "takeoff power," "takeoff thrust," and "takeoff rating" wherever the latter are used. The notice also proposed to delete the word "rating" wherever applied to engine "speed" since, under the concept of the new engine rating terminology, the term "rating" is properly applicable only to engine powers or thrusts. No adverse industry comments having been received, these changes are issued as proposed. In addition, § 33.7 is editorially amended to make it clear that, under the new terminology, the word "rating" applies to powers and thrusts, and the words "operating limitations" apply to other factors such as speeds, temperatures, and pressures. Consistent with the addition of the word "rated" to the definitions of "2½-minute power" (and thrust) and "30-minute power" (and thrust), the word "rated" is added where those power and thrust descriptions are used. Further, an inappropriate use of the word "rated" appears in § 33.49(c)(5): The words "normal rated" (speed) and "normal rated" (manifold pressure) are military usage corresponding with the Agency terminology "maximum continuous" (speed and manifold pressure). The latter terminology is used instead. Finally, consistent with the use of the word "rated" to describe approved powers and thrusts, § 33.97(b) is amended by deleting the words "maximum forward" (thrust) and inserting the words "rated takeoff thrust" in place thereof.

The notice proposed to add a new § 33.8 requiring that the applicant must select power or thrust ratings and that the selected ratings must be for the lowest power or thrust that all engines of the same type may be expected to produce under the conditions used to determine that rating. One comment objected for the following reasons: The commentator states that the current requirements are satisfactory and pose no compromise with safety. The Agency disagrees for the reasons stated in the notice. The commentator states that production tolerances should not be included in the type certification regulations. This amendment prescribes no production requirement in addition to the present requirement of conformity to the type design in the production requirements of Part 21. This amendment merely resolves an ambiguity concerning the meaning of the rating concept as an aspect of the type design so that there can be no doubt that no production engine conforms to its type design unless it equals or exceeds the specific power or thrust values assigned as ratings under the type design. The commentator states that reduction of ratings to represent the lower end of the anticipated range of power variation would result in aircraft manufacturers receiving engines of less power than those he would otherwise get. The Agency disagrees. The present rules do not authorize a negative tolerance with respect to production conformity to assigned ratings. As stated in the notice, conformity is not shown unless all production engines equal or exceed the assigned ratings. Since the assigned rating is the aircraft manufacturer's assurance of engine capability, assignment of power ratings to represent the low end of the expected production range of powers or thrusts will reduce unexpected power deficiencies, not cause them as claimed. The commentator states that no rule change is necessary if the industry specified a reasonable production tolerance, and states that this has been the past practice. A reasonable range of expected production power or thrust values is inevitable and is not prevented by this amendment. However, the current rules do not delegate to private persons the authority to prescribe negative tolerances so far as meeting minimums prescribed during type certification is concerned. The commentator states that production power variations do not adversely affect safety considering that other variables such as ambient conditions, propeller tolerances and airframe tolerances also exist. The Agency disagrees. Reliance by the aircraft manufacturer upon assigned engine ratings is necessary in order for him to correctly assess, and make allowance for, other production variables related to aircraft production. The commentator states that the hazardous situation cited in the preamble is not pertinent since it was related to the selection of an engine for a prototype aircraft rather than the selection of a power rating. The Agency disagrees. The hazard resulted because (1) the aircraft manufacturer in the example designed for performance based on an assigned engine rating, and (2) certain engines supplied did not meet their assigned ratings and failed to produce aircraft performance that was produced by engines that produced their assigned ratings. It is in the selection of an engine for a prototype that reliance upon assigned ratings by the aircraft manufacturer is necessary to ensure that production aircraft have the performance capabilities of the prototype aircraft. This comment cannot, therefore, be accepted. This amendment is drafted as proposed.

The notice proposed to amend § 33.17 to require that contact of flammable fluid with hot surfaces be "prevented" rather than "minimized" as at present. This proposal is withdrawn pending further study. The notice also proposed to delete the words "from heat, vibration, or fluid pressure" at the end of § 33.17(b). No adverse comments having been received on this part of the proposal, this amendment is drafted as proposed.

The notice proposed to amend § 33.23 to require that maximum allowable engine mounting attachment loads be specified by the applicant and that the engine mounting attachments and related structure be able to withstand the specified loads. One comment objected, stating that, instead of being required to specify maximum allowable loads, the engine manufacturer should "identify the design cases (e.g. maximum loading, rate of turn, engine seizure torque, etc.) and the associated time factors which were used in determining the critical loads * * *." Since this comment assumes that critical loads will be determined, it is not clear how the commentator's proposal would differ from the proposed amendment. The "design cases" mentioned by the commentator would be considered under the proposed amendment. The maximum allowable loads should be specified for use by subsequent aircraft applicants for the reasons stated in the notice. This amendment is therefor drafted as proposed.

The notice proposed to amend § 33.69 to reflect the single-ignition allowance proposed for Parts 27 and 29. Since those proposed amendments have been withdrawn for further study, the proposed amendment to § 33.69 is withdrawn accordingly.

Part 35—Airworthiness Standards: Propellers: In place of deleted § 35.15 (which proposed deletion is withdrawn above), the notice proposed to add a new section, entitled "Pitch Control System", which would have required that each variable pitch propeller that tends to go to low pitch if "the pitch control system

fails" must incorporate means to "automatically lock the pitch" to prevent hazardous overspeeding, and that "each pitch control system" that uses engine oil for feathering must incorporate means to "position the governor pilot valve for feathering without using engine oil" or incorporate means to "let feathering oil bypass the governor pilot valve." One comment stated that the words "the pitch control system fails" imply that the propeller manufacturer must anticipate all possible failures of pitch control system components whose design will not be known until later certification of an engine or aircraft. This is not intended. The commentator suggests language which would require the propeller manufacturer to consider hazardous overspeeding only where that hazard is caused by failure of the "pitch control mechanism contained within the propeller, or supplied with the propeller." This language is too narrow. The intended pitch changing function is a design feature of the propeller regardless of the location or certification status of the mechanisms for performing that function. If the propeller design includes an intended pitch changing method or function, safety requires that the consequence of failure of this intended function, within intended operating conditions, be given design consideration by the propeller applicant. New § 35.23(a) therefore provides that the propeller applicant is responsible for the overspeed consequences of loss of normal propeller pitch control, however caused, under "intended operating conditions". Responsibility and control by the propeller applicant over engine or aircraft "systems" or "mechanisms" that could cause such failures is not implied by this amendment. So far as the words "each pitch control" in proposed paragraph (b) are concerned, the Agency agrees that limitation to "each pitch control system within the propeller, or supplied with the propeller" is appropriate, since the propeller applicant's responsibility for systems, rather than intended propeller functions, is involved. Paragraph (b) is drafted accordingly. One comment stated that to require a means to "automatically lock the pitch" to prevent hazardous overspeeding could unnecessarily restrict design, and that the objective prevention of hazardous overspeeding is all that is necessary. The Agency agrees. Paragraph (a) is so drafted. Further, the Agency believes that a similarly unnecessary design restriction could result from the requirement, in proposed paragraph (b), that there be means to "position the governor pilot valve * * *" or means to "let feathering oil bypass the governor pilot valve". The objective of this proposal is to require means to override or bypass the normally operative hydraulic system components so as to allow feathering if those components fail or malfunction. Paragraph (b) is drafted accordingly. This amendment is renumbered as § 35.23.

The notice proposed to amend § 35.35 to make it clear that the section covers only blade retention strength and that an endurance test of the entire propeller is not intended under that section. No adverse comments having been received, this amendment is drafted as proposed.

The notice proposed to delete § 35.37, delete certain language in § 35.39, and add a new § 35.37, in order to establish that the intent of § 35.37 is to substantiate vibration load limits rather than merely record vibration loads withstood. Proposed new § 35.37 would have covered "each critical component" of each propeller. One comment objected, stating that "each critical component" could be strictly administered to require load limit establishment for every metal component. This is not intended. This amendment therefore is specifically limited to "each metal hub and metal blade" and "each primary load-carrying metal component of nonmetallic blades," but is otherwise drafted as proposed.

The notice proposed to amend § 35.39 to require that the prescribed tests be conducted on a propeller of the greatest diameter for which certification is requested. One comment objected for the following reasons: The commentator states that, in several ways, such as test airspeed and blade angle, the actual tests conducted under § 35.39 do not simulate operational loads and therefore do not "substantiate the propeller loads that are expected in operation", contrary to the notice. The Agency agrees that there are some operating conditions that are not simulated in the tests. However, notwithstanding these, proper test equipment can sufficiently simulate, and provide a basis to substantiate, the maximum steady loads that the propeller will actually experience in the takeoff regime when the power and engine speed are greatest, the airspeed and blade angle are lowest, and the corresponding thrust and centrifugal loads are the greatest. Substantiation of these loads is necessary for safety. Regardless of other variables in the testing process, substantiation of these loads cannot be properly established with reduced propeller diameters. The commentator states in effect that an inadequate testing environment obviates the need to use the full diameter in the test since any advantage in simulation that would result would be eliminated or hidden by the unrepresentative effects of the poor test environment. The Agency disagrees. Proper substantiation of the steady propeller takeoff loads is necessary for safety. No showing has been made that adequate test facilities cannot be designated and feasibly provided for this purpose. This amendment is therefore drafted as proposed.

In consideration of the foregoing, Subchapters A and C of Chapter I of Title 14 of the Code of Federal Regulations are amended, effective April 3, 1967, as follows:

PART 1—DEFINITIONS AND ABBREVIATIONS

(a) Part 1 § 1.1 is amended as follows:

§ 1.1 [Amended]

1. The following new definitions are added:

"Rated takeoff power," with respect to reciprocating, turbopropeller, and turboshaft engine type certification, means the approved brake horsepower that is developed statically under standard sea level conditions, within the engine operating limitations established under Part 33, and limited in use to periods of not over 5 minutes for takeoff operation.

"Rated takeoff thrust," with respect to turbojet engine type certification, means the approved jet thrust that is developed statically under standard sea level conditions, within the engine operating limitations established under Part 33, and limited in use to periods of not over 5 minutes for takeoff operation.

2. The definitions of "maximum continuous power" and "maximum continuous thrust" are amended to read as follows:

"Rated maximum continuous power," with respect to reciprocating, turbopropeller, and turboshaft engines, means the approved brake horsepower that is developed statically or in flight, in standard atmosphere at a specified altitude, within the engine operating limitations established under Part 33, and approved for unrestricted periods of use.

"Rated maximum continuous thrust," with respect to turbojet engines, means the approved jet thrust that is developed statically or in flight, in standard atmosphere at a specified altitude, within the engine operating limitations established under Part 33, and approved for unrestricted periods of use.

3. The definition of "2½-minute power" is amended by inserting the word "Rated" before the term "2½-minute power".

4. The definition of "30-minute power" is amended by inserting the word "Rated" before the term "30-minute power".

PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS

(b) Part 21 is amended as follows:

§ 21.21 [Amended]

1. Section 21.21(b)(2) is amended by striking out the words "or, for aircraft engines and propellers, that no feature or characteristic makes it unsafe for use on aircraft" after the word "requested".

§ 21.128 [Amended]

2. Section 21.128(a)(1) is amended by striking out the words "the maximum continuous rating" and inserting the words "rated maximum continuous power or thrust" in place thereof, and by striking out the words "the takeoff rating" and inserting the words "rated takeoff power or thrust" in place thereof.

3. Section 21.128(a)(2) is amended by:

(1) Striking out the words "the maximum continuous rating" after the words "operation at", and inserting the words "rated maximum continuous power or thrust" in place thereof.

(2) Striking out the words "the maximum continuous rating" between the words "higher than" and "the 5-hour", and inserting the words "rated maximum continuous power or thrust" in place thereof.

(3) Striking out the words "takeoff rating" between the words "having a" and "higher than", and inserting the words "rated takeoff power or thrust" in place thereof.

(4) Striking out the words "the takeoff rating" after the words "30 minutes at", and inserting the words "rated takeoff power or thrust" in place thereof.

PART 33—AIRWORTHINESS STANDARDS: AIRCRAFT ENGINES

(c) Part 33 is amended as follows:

1. Section 33.7 is amended to read as follows:

§ 33.7 Engine ratings and operating limitations.

Engine ratings and operating limitations established by the Administrator are based on the engine operating conditions demonstrated during the block tests required by this part and include power and thrust ratings, and include operating limitations relating to speeds, temperatures, pressures, fuels, and oils which the Administrator finds necessary for safe operation of the engine.

2. The following new section is added after § 33.7:

§ 33.8 Selection of engine power and thrust ratings.

(a) Requested engine power and thrust ratings must be selected by the applicant.

(b) Each selected rating must be for the lowest power or thrust that all engines of the same type may be expected to produce under the conditions used to determine that rating.

§ 33.17 [Amended]

3. Section 33.17(b), last sentence, is amended by deleting the words "from heat, vibration, or fluid pressure".

4. Section 33.23 is amended to read as follows:

§ 33.23 Engine mounting attachments and structure.

(a) The maximum allowable loads for engine mounting attachments and related structure must be specified by the applicant.

(b) The engine mounting attachments and related structure must be able to withstand the specified loads without failure, malfunction, or permanent deformation.

§ 33.43 [Amended]

5. Section 33.43 is amended by striking out the word "rating" following the words "maximum continuous speed" and also following the words "takeoff speed".

6. Section 33.49 is amended to read as follows:

§ 33.49 Endurance test.

(a) *General.* Each engine must be subjected to an endurance test (with a representative propeller) that includes a total of 150 hours of operation and, depending upon the type and contemplated use of the engine, consists of one of the series of runs specified in paragraphs (b) through (d) of this section, as applicable. The runs must be performed in the periods and order found appropriate by the Administrator for the specific engine. During the endurance test the engine power and the crankshaft rotational speed must be controlled within ±3 percent of the specified values.

(b) *Single-speed engines.* For engines not incorporating a supercharger and for those incorporating a single-speed supercharger, each applicant must make the following runs:

(1) A 30-hour run consisting of alternate periods of 5 minutes at rated takeoff power with takeoff speed, and 5 minutes at maximum best economy cruising power or maximum recommended cruising power.

(2) A 20-hour run consisting of alternate periods of 1½ hours at rated maximum continuous power with maximum continuous speed, and ½ hour at 75 percent rated maximum continuous power and 91 percent maximum continuous speed.

(3) A 20-hour run consisting of alternate periods of 1½ hours at rated maximum continuous power with maximum continuous speed, and ½ hour at 70 percent rated maximum continuous power and 89 percent maximum continuous speed.

(4) A 20-hour run consisting of alternate periods of 1½ hours at rated maximum continuous power with maximum continuous speed, and ½ hour at 65 percent rated maximum continuous power and 87 percent maximum continuous speed.

(5) A 20-hour run consisting of alternate periods of 1½ hours at rated maximum continuous power with maximum continuous speed, and ½ hour at 60 percent rated maximum continuous power and 84.5 percent maximum continuous speed.

(6) A 20-hour run consisting of alternate periods of 1½ hours at rated maximum continuous power with maximum continuous speed, and ½ hour at 50 percent rated maximum continuous power and 79.5 percent maximum continuous speed.

(7) A 20-hour run consisting of alternate periods of 2½ hours at rated maximum continuous power with maximum continuous speed, and 2½ hours at maximum best economy cruising power or at maximum recommended cruising power.

(c) *Two-speed engines.* Each engine incorporating a two-speed supercharger must undergo the following runs:

(1) A 30-hour run consisting of alternate periods in the lower gear ratio of 5 minutes at rated takeoff power with takeoff speed, and 5 minutes at maximum best economy cruising power or at maximum recommended cruising power. If a takeoff power rating is desired in the higher gear ratio, 15 hours of the 30-hour run must be made in the higher gear ratio in alternate periods of 5 minutes at the observed horsepower obtainable with the takeoff critical altitude manifold pressure and takeoff speed, and 5 minutes at 70 percent high ratio rated maximum continuous power and 89 percent high ratio maximum continuous speed.

(2) A 15-hour run consisting of alternate periods in the lower gear ratio of 1 hour at rated maximum continuous power with maximum continuous speed, and ½ hour at 75 percent rated maximum continuous power and 91 percent maximum continuous speed.

(3) A 15-hour run consisting of alternate periods in the lower gear ratio of 1 hour at rated maximum continuous power with maximum continuous speed, and ½ hour at 70 percent rated maximum continuous power and 89 percent maximum continuous speed.

(4) A 30-hour run in the higher gear ratio at rated maximum continuous power with maximum continuous speed.

(5) A 5-hour run consisting of alternate periods of 5 minutes in each of the supercharger gear ratios. The first 5 minutes of the test must be made at maximum continuous speed in the higher gear ratio and the observed horsepower obtainable with 90 percent of maximum continuous manifold pressure in the higher gear ratio under sea level conditions. The condition for operation for the alternate 5 minutes in the lower gear ratio must be that obtained by shifting to the lower gear ratio at constant speed.

(6) A 10-hour run consisting of alternate periods in the lower gear ratio of 1 hour at rated maximum continuous power with maximum continuous speed, and 1 hour at 65 percent rated maximum continuous power and 87 percent maximum continuous speed.

(7) A 10-hour run consisting of alternate periods in the lower gear ratio of 1 hour at rated maximum continuous power with maximum continuous speed, and 1 hour at 60 percent rated maximum continuous power and 84.5 percent maximum continuous speed.

(8) A 10-hour run consisting of alternate periods in the lower gear ratio of 1 hour at rated maximum continuous power with maximum continuous speed, and 1 hour at 50 percent rated maximum continuous power and 79.5 percent maximum continuous speed.

(9) A 20-hour run consisting of alternate periods in the lower gear ratio of 2 hours at rated maximum continuous power with maximum continuous speed, and 2 hours at maximum best economy cruising power and speed or at maximum recommended cruising power.

(10) A 5-hour run in the lower gear ratio at maximum best economy cruising power and speed or at maximum recommended cruising power and speed.

Where simulated altitude test equipment is not available when operating in the higher gear ratio, the runs may be made at the observed horsepower obtained with the critical altitude manifold pressure or specified percentages thereof, and the fuel-air mixtures may be adjusted to be rich enough to suppress detonation.

(d) *Helicopter engines.* To be eligible for use on a helicopter each engine must either comply with paragraphs (a) through (j) of § 29.923 of this chapter,

or must undergo the following series of runs:

(1) A 35-hour run consisting of alternate periods of 30 minutes each at rated takeoff power with takeoff speed, and at rated maximum continuous power with maximum continuous speed.

(2) A 25-hour run consisting of alternate periods of 2½ hours each at rated maximum continuous power with maximum continuous speed, and at 70 percent rated maximum continuous power with maximum continuous speed.

(3) A 25-hour run consisting of alternate periods of 2½ hours each at rated maximum continuous power with maximum continuous speed, and at 70 percent rated maximum continuous power with 80 to 90 percent maximum continuous speed.

(4) A 25-hour run consisting of alternate periods of 2½ hours each at 80 percent rated maximum continuous power with takeoff speed, and at 80 percent rated maximum continuous power with 80 to 90 percent maximum continuous speed.

(5) A 25-hour run consisting of alternate periods of 2½ hours each at 80 percent rated maximum continuous power with takeoff speed, and at either rated maximum continuous power with 110 percent maximum continuous speed or at rated takeoff power with 103 percent takeoff speed, whichever results in the greater speed.

(6) A 15-hour run at 105 percent rated maximum continuous power with 105 percent maximum continuous speed or at full throttle and corresponding speed at standard sea level carburetor entrance pressure, if 105 percent of the rated maximum continuous power is not exceeded.

§ 33.51 [Amended]

7. Section 33.51 is amended by inserting the word "rated" between the words "settings for" and "maximum continuous".

§ 33.73 [Amended]

8. Section 33.73 is amended by striking out the word "of" between the words "percent" and "takeoff" and inserting the word "rated" in place thereof.

§ 33.87 [Amended]

9. Section 33.87 is amended as follows:

(1) Section 33.87(b)(1) is amended by inserting the word "rated" between the words "periods at" and "takeoff power" in the first sentence; by inserting the word "power" between the words "augmented takeoff" and "ratings that" in the 4th sentence, and by inserting the word "power" between the words "augmented takeoff" and "ratings that" in the 5th sentence.

(2) Section 33.87(b)(2) is amended by striking out the word "*Maximum*" in the heading and inserting the words "*Rated maximum*" in place thereof; by inserting the word "rated" between the words "duration at" and "maximum continuous"; and by inserting the word "rated" between the words "duration at" and "takeoff power".

(3) Section 33.87(b)(3) is amended by striking out the word "*Maximum*" in the heading and inserting the words "*Rated maximum*" in place thereof; and by striking out the word "the" between the words "at" and "maximum" and inserting the word "rated" in place thereof.

(4) Section 33.87(b)(5) is amended by inserting the word "rated" between the words "thrust to" and "takeoff power".

(5) Section 33.87(c)(1) is amended by inserting the word "rated" between the words "periods at" and "takeoff power"; by inserting the word "power" between the words "augmented takeoff" and "ratings that"; and by inserting the word "power" between the words "the augmented" and "rating".

(6) Section 33.87(c)(2) is amended by inserting the word "*Rated*" after the figure "(2)"; and by inserting the word "rated" between the words "at" and "30-minute power".

(7) Section 33.87(c)(3) is amended by striking out the word "*Maximum*" in the heading and inserting the words "*Rated maximum*" in place thereof; and by striking out the word "the" between the words "at" and "maximum" and inserting the word "rated" in place thereof.

(8) Section 33.87(c)(5) is amended by inserting the word "rated" between the words "thrust to" and "takeoff power".

(9) Section 33.87(c)(7) is amended by inserting the word "rated" between the words "all the" and "takeoff power", and by inserting the word "rated" between the words "takeoff power," and "30-minute power", after the comma.

(10) Section 33.87(d)(1) is amended by inserting the word "rated" between the words "periods at" and "takeoff power"; by inserting the word "rated" between the words "conducted at" and "takeoff power"; by inserting the word "rated" between the words "conducted at" and "2½ minute"; and by inserting the word "power" between the words "augmented takeoff" and "ratings that".

(11) Section 33.87(d)(3) is amended by inserting the word "rated" between the words "all the" and "takeoff"; by inserting the words "power, rated" between the word "takeoff" and "2½ minute"; and by inserting the word "rated", following the comma, between the words "minute power" and "30-minute".

§ 33.95 [Amended]

10. Section 33.95 is amended as follows:

(1) Section 33.95(b) is amended by inserting the word "rated" between the words "from" and "maximum".

(2) Section 33.95(c) is amended by inserting the word "rated" between words "from" and "maximum".

(3) Section 33.95(d) is amended by inserting the word "rated" between the words "cycles at" and "maximum continuous".

11. Section 33.97(b), first sentence, is amended by deleting the words "maximum forward" and inserting the words "rated takeoff thrust" in place thereof.

PART 35—AIRWORTHINESS STANDARDS: PROPELLERS

(d) Part 25 is amended as follows:

1. By adding the following new section after § 35.21:

§ 35.23 Pitch control.

(a) No loss of normal propeller pitch control may cause hazardous overspeeding of the propeller under intended operating conditions.

(b) Each pitch control system that is within the propeller, or supplied with the propeller, and that uses engine oil for feathering, must incorporate means to override or bypass the normally operative hydraulic system components so as to allow feathering if those components fail or malfunction.

§ 35.35 [Amended]

2. Section 35.35 is amended by:

(1) Seriking out the heading "*Centrifugal load test*" and inserting the heading "*Blade retention test*" in place thereof; and

(2) Striking out the words "one-hour" between the words "either a" and "whirl test".

3. Section 35.37 is amended to read as follows:

§ 35.37 Vibration load limit test.

The vibration load limits of each metal hub and metal blade, and of each primary load-carrying metal component of nonmetallic blades, must be determined for all reasonably foreseeable vibration load patterns.

§ 35.39 [Amended]

4. Section 35.39(a) is amended as follows:

(1) Subparagraph (a)(2) is amended by adding the following new sentence at the end thereof: "This test must be conducted on a propeller of the greatest diameter for which certification is requested."

(2) Subparagraph (a)(3) is amended by adding the following new sentence at the end thereof: "This test must be conducted on a propeller of the greatest diameter for which certification is requested."

5. Section 35.39(c) is amended as follows:

(1) The following sentence is inserted between the paragraph heading "*Variable-pitch propellers*" and the first sentence: "Compliance with this paragraph must be shown for a propeller of the greatest diameter for which certification is requested."

(2) The second sentence of subparagraph (c)(1) is amended to read as follows: "Each test must be made at the maximum continuous rotational speed and power rating of the propeller."

(Secs. 313(a), 601, 603, Federal Aviation Act of 1958; 49 U.S.C. 1354(a), 1421, 1423)

Issued in Washington, D.C., on February 24, 1967.

WILLIAM F. MCKEE,
Administrator.

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