Issued: November 29, 1977.

PATRICIA ROBERTS HARRIS,
*Secretary.*

[FR Doc. 78-723 Filed 1-13-78; 8:45 am]

[4210-01]

[Docket No. FI-3316]

**PART 1917—APPEALS FROM FLOOD ELEVATION DETERMINATIONS AND JUDICIAL REVIEW**

**Final Flood Elevation Determinations for Village of Campbellsport, Fond du Lac County, Wis.**

AGENCY: Federal Insurance Administration, HUD.

ACTION: Final rule.

SUMMARY: Final base (100-year) flood elevations are listed below for selected locations in the Village of Campbellsport, Fond du Lac County, Wis. These base (100-year) flood elevations are the basis for the flood plain management measures that the community is required to either adopt or show evidence of being already in effect in order to qualify or remain qualified for participation in the National Flood Insurance Program (NFIP).

EFFECTIVE DATE: The date of issuance of the Flood Insurance Rate Map (FIRM), showing base (100-year) flood elevations, for the Village of Campbellsport, Wis.

ADDRESS: Maps and other information showing the detailed outlines of the flood-prone areas and the final elevations for the Village of Campbellsport, are available for review at Village Hall, 177 Main Street, Campbellsport, Wis.

FOR FURTHER INFORMATION CONTACT:

Mr. Richard Krimm, Assistant Administrator, Office of Flood Insurance, 202-755-5581 or toll free line 800-424-8872, Room 5270, 451 Seventh Street SW., Washington, D.C. 20410.

SUPPLEMENTARY INFORMATION: The Federal Insurance Administrator gives notice of his final determinations of flood elevations for the Village of Campbellsport, Wis.

This final rule is issued in accordance with section 110 of the Flood Disaster Protection Act of 1973 (Pub. L. 93-234), 87 Stat. 980, which added section 1363 to the National Flood Insurance Act of 1968 (Title XIII of the Housing and Urban Development Act of 1968 (Pub. L. 90-448), 42 U.S.C. 4001-4128, and 24 CFR Part 1917.4(a)). An opportunity for the community or individuals to appeal this determination to or through the community for a period of ninety (90) days has been provided. No appeals of the proposed base flood elevations were received from the community or from individuals within the community.

The Administrator has developed criteria for flood plain management in flood-prone areas in accordance with 24 CFR Part 1910.

The final base (100-year) flood elevations for selected locations are:

| Source of flooding | Location | Elevation in feet, national geodetic vertical datum |
|---|---|---|
| Upper Milwaukee River. | Dam | 998 |
| | Main St | 990 |
| | New Cassel St | 986 |

(National Flood Insurance Act of 1968 (Title XIII of Housing and Urban Development Act of 1968), effective January 28, 1969 (33 FR 17804, November 28, 1968), as amended (42 U.S.C. 4001-4128); and Secretary's delegation of authority to Federal Insurance Administrator, 34 FR 2680, February 27, 1969, as amended (39 FR 2787, January 24, 1974).)

Issued: November 29, 1977.

PATRICIA ROBERTS HARRIS,
*Secretary.*

[FR Doc. 78-724 Filed 1-13-78; 8:45 am]

[4210-01]

[Docket No. FI-3317]

**PART 1917—APPEALS FROM FLOOD ELEVATION DETERMINATIONS AND JUDICIAL REVIEW**

**Final Flood Elevation Determinations for the City of Greenfield, Milwaukee County, Wis.**

AGENCY: Federal Insurance Administration, HUD.

ACTION: Final rule.

SUMMARY: Final base (100-year) flood elevations are listed below for selected locations in the City of Greenfield, Milwaukee County, Wis. These base (100-year) flood elevations are the basis for the flood plain management measures that the community is required to either adopt or show evidence of being already in effect in order to qualify or remain qualified for participation in the National Flood Insurance Program (NFIP).

EFFECTIVE DATE: The date of issuance of the Flood Insurance Rate Map (FIRM), showing base (100-year) flood elevations, for the City of Greenfield, Wis.

ADDRESS: Maps and other information showing the detailed outlines of the flood-prone areas and the final elevations for the City of Greenfield, are available for review at City Hall, 7325 West Forest Home Avenue, Greenfield, Wis.

FOR FURTHER INFORMATION CONTACT:

Mr. Richard Krimm, Assistant Administrator, Office of Flood Insurance, 202-755-5581 or toll free line 800-424-8872, Room 5270, 451 Seventh Street SW., Washington, D.C. 20410.

SUPPLEMENTARY INFORMATION: The Federal Insurance Administrator gives notice of his final determinations of flood elevations for the City of Greenfield, Wis.

This final rule is issued in accordance with section 110 of the Flood Disaster Protection Act of 1973 (Pub. L. 93-234), 87 Stat. 980, which added section 1363 to the National Flood Insurance Act of 1968 (Title XIII of the Housing and Urban Development Act of 1968 (Pub. L. 90-448), 42 U.S.C. 4001-4128, and 24 CFR Part 1917.4(a)). An opportunity for the community or individuals to appeal this determination to or through the community for a period of ninety (90) days has been provided. No appeals of the proposed base flood elevations were received from the community or from individuals within the community.

The Administrator has developed criteria for flood plain management in flood-prone areas in accordance with 24 CFR Part 1910.

The final base (100-year) flood elevations for selected locations are:

| Source of flooding | Location | Elevation in feet, national geodetic vertical datum |
|---|---|---|
| Root River | Morgan Ave | 730 |
| | Beloit Rd | 727 |
| | 108th St. (State Trunk Highway 100). | 726 |
| | Cold Spring Rd | 724 |
| | State Trunk Highway 15 South (U.S. Highway 45). | 723 |
| | State Trunk Highway 15 North (U.S. Highway 45). | 723 |
| | Layton Ave. (County Trunk Highway "Y"). | 722 |
| | Abandoned railroad bridge. | 722 |
| | Forest Home Ave. (State Trunk Highway 34). | 721 |

(National Flood Insurance Act of 1968 (Title XIII of Housing and Urban Development Act of 1968), effective January 28, 1969 (33 FR 17804, November 28, 1968), as amended (42 U.S.C. 4001-4128); and Secretary's delegation of authority to Federal Insurance Administrator, 34 FR 2680, February 27, 1969, as amended (39 FR 2787, January 24, 1974).)

Issued: November 29, 1977.

PATRICIA ROBERTS HARRIS,
*Secretary.*

[FR Doc. 78-725 Filed 1-13-78; 8:45 am]

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[4210-01]

[Docket No. FI-3319]

## PART 1917—APPEALS FROM FLOOD ELEVATION DETERMINATIONS AND JUDICIAL REVIEW

### Final Flood Elevation Determinations for City of Gillette, Campbell County, Wyo.

AGENCY: Federal Insurance Administration, HUD.

ACTION: Final rule.

SUMMARY: Final base (100-year) flood elevations are listed below for selected locations in the City of Gillette, Campbell County, Wyo. These base (100-year) flood elevations are the basis for the flood plain management measures that the community is required to either adopt or show evidence of being already in effect in order to qualify or remain qualified for participation in the National Flood Insurance Program (NFIP).

EFFECTIVE DATE: The date of issuance of the Flood Insurance Rate Map (FIRM), showing base (100-year) flood elevations, for the City of Gillette, Wyo.

ADDRESS: Maps and other information showing the detailed outlines of the flood-prone areas and the final elevations for the City of Gillette, are available for review at City Hall, 400 South Gillette Avenue, Gillette, Wyo.

FOR FURTHER INFORMATION CONTACT:

Mr. Richard Krimm, Assistant Administrator, Office of Flood Insurance, 202-755-5581 or toll free line 800-424-8872, Room 5270, 451 Seventh Street SW., Washington, D.C. 20410.

SUPPLEMENTARY INFORMATION: The Federal Insurance Administrator gives notice of his final determination of flood elevations for the City of Gillette, Wyo.

This final rule is issued in accordance with section 110 of the Flood Disaster Protection Act of 1973 (Pub. L. 93-234), 87 Stat. 980, which added section 1363 to the National Flood Insurance Act of 1968 (Title XIII of the Housing and Urban Development Act of 1968 (Pub. L. 90-448), 42 U.S.C. 4001-4128, and 24 CFR Part 1917.4(a)). An opportunity for the community or individuals to appeal this determination to or through the community for a period of ninety (90) days has been provided. No appeals of the proposed base flood elevations were received from the community or from individuals within the community.

The Administrator has developed criteria for flood plain management in flood-prone areas in accordance with 24 CFR Part 1910.

The final base (100-year) flood elevations for selected locations are:

| Source of flooding | Location | Elevation in feet, national geodetic vertical datum |
|---|---|---|
| Stone Pile Creek ... | U.S. Highways 14 and 16 (upstream side). | 4,576 |
| | Burlington Northern RR Bridge (river mile 5.62). | 4,563 |
| | Burlington Northern RR Bridge (river mile 3.73). | 4,537 |
| | Interstate 90 ..... | 4,505 |
| East Branch ..... | Upstream limit ..... | 4,533 |
| | Downstream limit | 4,528 |
| West Branch ..... | Upstream limit ..... | 4,574 |
| | Downstream limit | 4,559 |
| Donkey Creek tributary. | 36-in concrete pipe (4-J Rd). | 4,540 |
| | Twin 48-in concrete pipe (Douglas Ave). | 4,525 |
| | Twin 48-in concrete pipe (river mile 0.23). | 4,524 |
| | Twin 48-in concrete pipe (river mile 0.14). | 4,523 |
| | Twin 48-in concrete pipe (Lakeway County Rd). | 4,522 |
| | Twin 48-in concrete pipe (river mile 0.04). | 4,521 |

(National Flood Insurance Act of 1968 (Title XIII of Housing and Urban Development Act of 1968), effective January 28, 1969 (33 FR 17804, November 28, 1968), as amended (42 U.S.C. 4001-4128); and Secretary's delegation of authority to Federal Insurance Administrator, 34 FR 2680, February 27, 1969, as amended (39 FR 2787, January 24, 1974).)

Issued: November 29, 1977.

PATRICIA ROBERTS HARRIS,
*Secretary.*

[FR Doc. 78-726 Filed 1-13-78; 8:45 am]

federal register

MONDAY, JANUARY 16, 1978
PART IV


# DEPARTMENT OF TRANSPORTATION

## Federal Aviation Administration

■

# AIRWORTHINESS REVIEW PROGRAM

## Flight Amendments

[ 4910–13 ]

Title 14—Aeronautics and Space

CHAPTER I—FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

[Docket Nos. 14684 and 14324; Amendment Nos. 1–29; 21–46; 23–21; 25–42; 27–14; 29–15; 91–145 and 121–1381]

## AIRWORTHINESS REVIEW PROGRAM

### Amendment No. 6: Flight Amendments

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The purpose of these amendments to the Federal Aviation Regulations is to update and improve—(1) the airworthiness standards applicable to aircraft performance, flight characteristics, flight manuals, and operating limitations; (2) the operating rules containing related airworthiness standards; and (3) the rules governing holders of type certificates. These amendments are part of the Airworthiness Review Program.

EFFECTIVE DATE: MARCH 1, 1978.

FOR FURTHER INFORMATION CONTACT:

Adolfo O. Astorga, Airworthiness Review Branch (AFS–910), Flight Standards Service, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C. 20591; telephone (202) 755–8714.

SUPPLEMENTARY INFORMATION: These amendments are the sixth in a series of amendments to be issued as part of the Airworthiness Review Program. The following series of amendments have previously been issued as part of this Airworthiness Review Program:

| *Title* | *FR citation* |
|---|---|
| Form number and clarifying revisions. | (40 FR 2576; Jan. 14, 1975). |
| Rotorcraft anticollision light standards. | (41 FR 5290; Feb. 5, 1976). |
| Miscellaneous amendments. | (41 FR 55454; Dec. 20, 1976). |
| Powerplant amendments. | (42 FR 15034; March 17, 1977). |
| Equipment and systems amendments. | (42 FR 36960; July 18, 1977) |

These amendments are based on two Notices of Proposed Rule Making—Notice 75–10 published in the FEDERAL REGISTER on March 7, 1975 (40 FR 10802); and Notice 75–25 published in the FEDERAL REGISTER on June 9, 1975 (40 FR 24664). The amendments based on Notice 75–10 were deferred in the series of amendments titled "Miscellaneous Amendments" so that they could be considered with the final disposition of certain proposals in Notice 75–25. The discussions of the comments received for the deferred proposals are included under the heading of the related Notice 75–25 proposals.

Interested persons have been afforded an opportunity to participate in the making of these amendments and due consideration has been given to all matter presented. A number of substantive changes and changes of an editorial and clarifying nature have been made to the proposed rules based upon relevant comments received and upon further review within the FAA. Except for minor editorial and clarifying changes and the substantive changes discussed below, these amendments and the reasons for them are the same as those contained in Notices 75–10 and 75–25.

DISCUSSION OF COMMENTS

The following discussion is keyed to the like-numbered proposals contained in Notice 75–25.

*Proposal 6–1.* No unfavorable comments were received on the proposal to amend § 1.1 by deleting the term "Accelerate-stop distance" and its definition. Accordingly, the proposal is adopted without substantive change.

*Proposal 6–2.* For a comment related to the proposal to amend § 1.2, see Proposal 6–34.

*Proposal 6–3.* One commentator suggested that proposed new § 21.5 concerning Airplane and Rotorcraft Flight Manuals be revised to make clear that other titles for the required Flight Manual, such as Pilot's Operating Handbook, will continue to be approved. The FAA has no objection to the use of the term Pilot's Operating Handbook as the main title. However, if an applicant chooses to use the title Pilot's Operating Handbook, he must include a statement on the title page indicating that the document is the FAA-required Airplane or Rotorcraft Flight Manual.

The same commentator pointed out that on airplanes of types for which Flight Manuals were not furnished in the past, much of the required information was furnished on placards and markings, and that, if this proposal is adopted, some of the placards would no longer be needed but would still be part of the airplane's certification basis. The FAA agrees that some placards may not be necessary after the information is furnished in a Flight Manual. However, application may be made to change the type design if the applicable regulations only require that the material be in either a Flight Manual or in any combination of approved manual materials, markings, and placards.

The same commentator also stated that proposed § 21.5(b) would penalize airplanes that were designed and tested to temperatures higher than the hot day condition prescribed in § 23.1043(b)(1). The FAA does not agree because the temperature for which cooling was demonstrated would be furnished in the Flight Manual as information, not as a limitation. It should be noted that, in response to Proposal 6–29, this commentator stated that there is no objection to furnishing the test temperature if it is not a limitation.

Two commentators stated that it should be made clear that, for rotorcraft originally certificated with a flight manual, the manual originally approved need not be revised to include the new requirements of this proposal. The FAA does not believe a revision is necessary since proposed § 21.5(b), in conjunction with proposed § 21.5(a), refers only to airplanes or rotorcraft that were not type certificated with an Airplane or Rotorcraft Flight Manual.

Another commentator said that requiring Flight Manuals to be furnished for aircraft previously type certificated without a Flight Manual places too large a burden on the holders of these type certificates. The FAA does not agree since the information to be included in the Flight Manual has already been furnished in other forms. In addition, a Flight Manual would provide the operator with essential information in a consolidated, organized form suitable for study and reference. The FAA believes that these benefits outweigh the burden of preparing and printing the Manual.

One commentator, who concurred with the proposal, recommended that the turbulent air penetration speed, least angle of glide speed, and least rate of descent speed (power off) be added to the required information. These are specific requirements which are not applicable to all categories of aircraft and the FAA does not believe they should be included in the rule.

The phrase "maximum anticipated air temperature" in proposed § 21.5(b)(2) is deleted and the phrase "maximum ambient atmospheric temperature" is inserted in its place to be consistent with Proposal 6–20 to amend § 23.1043 and the corresponding proposals for the other certification parts, which are being adopted in this series of amendments.

The proposal to add a new § 21.5 is adopted with the revision discussed above.

*Proposal 6–4.* For comments related to the proposal to amend § 23.25(b), see Proposal 6–5. The proposal to amend § 23.25(b) is adopted without substantive change.

*Proposal 6–5.* One commentator objected to the proposal to amend § 23.29, which would require the empty weight to be determined with "full" operating fluids, on the ground that this procedure would eliminate the option of "off loading" oil in order to maintain weight and center of gravity limits. The FAA does not agree. This option would not be eliminated by proposed § 23.29 since it merely establishes a new reference basis for empty weight. The same commentator stated that since this proposed rule is not retroactive, confusion will result because some aircraft will have oil included in the weight and balance and others will not. This commentator also suggested that the use of the same definition of empty weight by the FAA and the military would eliminate the difficulties encountered by pilots operating both military and civil aircraft. The FAA does not believe that the proposed change will cause confusion or difficulty in either situation cited by the commentator since

the weight and balance data accompanying each airplane will specify whether oil is included in the empty weight. Further, this procedure should simplify weight and balance computations since fluids normally included will be accounted for without further additions to the empty weight.

One commentator objected to the proposals to amend §§ 27.29 and 29.29 on the ground that there is no benefit to be gained by changing the definition of empty weight. The FAA does not agree with this comment for the reasons stated in the Notice for these proposals. This commentator further objected to the proposal to amend § 27.29 on the ground that it would create a problem for helicopters that have a larger oil tank capacity than is required under all conditions, such as helicopters designed to accept auxiliary fuel tanks. The option of off-loading oil would not be eliminated by proposed § 27.29. In addition, the FAA believes that the change will accomplish its purpose of simplifying weight and balance computations for the great majority of helicopters.

Several commentators on the proposal to amend § 25.29 noted that the proposed rule would require certain fluids which, in transport category airplanes, are variable as a function of individual operator or mission requirements and of passenger seating density (such as potable water and lavatory pre-charge fluids) to be included in the empty weight. It was suggested that an exception be provided for those fluids that vary with operation or mission as well as those that are expendable in flight such as water intended for injection in the engines. The FAA believes that exceptions for the specific fluids noted are warranted for airplanes, but the FAA does not believe that an exception is appropriate for potable water or lavatory pre-charge water for rotorcraft. The proposals to amend §§ 23.29 and 25.29 are revised accordingly.

*Proposal 6–6.* A commentator objected to the proposed change to § 23.45, stating that a requirement to correct the performance to 80 percent relative humidity is not necessary, that it would increase the cost and complexity of certification without any increase in safety, and that it will create a new standard atmosphere that will result in confusion as to the basis for engine performance data. The power loss that is associated with changing from dry air to air at 80 percent relative humidity would cause a significant reduction in the climb performance of a reciprocating-engine powered airplane and should be considered. This reduction would be most evident where performance is marginal, e.g., during one-engine-inoperative climb. With regard to turbine engines, the FAA believes that the effect of humidity may be negligible on some types of engines, in which case no performance correction would be necessary. However, for some other types of turbine engines, a correction for humidity will increase the accuracy of the performance data. The FAA believes that the data required for making the corrections can be obtained simply and with inexpensive instrumentation. Further, the FAA does not believe that requiring a correction for humidity in the performance data for newly type-certificated airplanes will result in confusion. A transition period may exist during which the performance data for newly type-certificated airplanes will be corrected for humidity and that for other airplanes may not be. Such transition periods inevitably occur with the adoption of new regulatory provisions and the FAA does not believe that the transition in this case will present a significant problem.

The commentator further stated that present performance measurement accuracy is within the range of uncontrolled airplane-to-airplane variations, atmospheric variations other than humidity, and piloting variations, and that eliminating one variable whose effect is within the spread of other variables is not justifiable on a simple cost-benefit analysis. The FAA does not agree that the humidity correction should be omitted on the basis of conjecture that other variables may mask its effect. Certification flight testing is not allowed when atmospheric variables would affect data accuracy, and tests must be repeated as necessary to establish confidence in data accuracy.

In regard to the burden of correcting for humidity in type certification, the FAA believes that it should in many cases humidity is not significant or that it is covered by a conservative correction factor. Correction of performance data to standard atmospheric conditions of temperature and pressure is required in any case, and an additional correction for humidity should be a relatively small burden.

The proposal for § 23.45 is adopted without substantive change.

*Proposal 6–7.* No unfavorable comments were received on the proposal to amend § 23.49. Accordingly, the proposal is adopted without substantive change.

*Proposal 6–8.* One commentator suggested that, for consistency with certain foreign requirements, proposed §§ 23.51 (c)(1)(ii) and (c)(2)(i) should be revised to read 1.2 $V_{S_1}$, instead of 1.3 $V_{S_1}$. The FAA does not believe that the recommended change is necessary. Proposed §§ 23.51 (c)(1)(ii) and (c)(2)(i) already provide for a speed less than 1.3 $V_{S_1}$.

The first commentator also stated that proposed § 23.51(c)(1)(ii) should be revised so that it refers to the complete failure of a single engine (on multiengine airplanes) instead of complete engine failure which would introduce a double failure concept not inherent in these rules. The FAA does not agree. Proposed § 23.51(c)(1)(ii), which is consistent with current § 23.51(a)(2)(ii) in this regard, only requires that "complete engine failure" be investigated if a speed of less than 1.3 $V_{S_1}$ is demonstrated at a height of 50 feet. In addition, current § 23.51(a)(2)(ii) has been consistently interpreted to require that for multiengine airplanes which meet the powerplant isolation requirements of § 23.903 (c) in the takeoff configuration, only one engine need be made inoperative in the specified investigations.

One commentator objected to the extension of takeoff performance determination requirements to airplanes of 6,000 pounds and less maximum weight, for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3.

Another commentator recommended that those provisions of the existing rule which relate to nosewheel and tailwheel liftoff speeds be retained and that their applicability be extended to all airplanes. These provisions were originally imposed in lieu of a requirement for approved takeoff performance data for airplanes of 6,000 pounds and less maximum weight. In view of the requirements which are being adopted, and in view of satisfactory service history for airplanes of more than 6,000 pounds maximum weight, the FAA does not believe these provisions should be retained or that their applicability should be extended to all airplanes.

The proposal to revise § 23.51 is adopted without substantive change.

*Proposal 6–9.* One commentator objected to the application of proposed § 23.65, concerning all-engines operating climb requirements, to airplanes of 6,000 pounds or less maximum weight for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3.

Another commentator stated that use of a reduced propeller pitch under proposed § 23.65(b) is not consistent with safety requirements, because it would either deny the pilot performance in actual operation or the protection of limiting the engine to a safe speed. The FAA does not agree. Present § 23.33 defines the pitch and speed limitations for propellers which are to be used in service. Proposed § 23.65(b), which is identical to the present § 23.65(a)(2), merely authorizes the use of a special test propeller pitch setting if it is necessary to obtain rated engine r.p.m. at $V_x$.

In proposed § 23.65(c), reference to the airplane configuration was inadvertently omitted. The configuration should be the same as that specified in proposed § 23.65 (a), and proposed 23.65(c) is therefore revised to state that the climb gradient is to be met with the airplane in the configuration prescribed in paragraph (a). In addition, § 23.65(a)(4) is revised to cover means other than cowl flaps for controlling the engine cooling air supply. This change is necessary to provide for turbine engines. The proposal to revise § 23.65 is adopted with the revisions discussed above.

*Proposal 6–10.* One commentator suggested that a speed to be used in calcu-

lating the climb gradients should be specified in proposed § 23.67(c) for purposes of uniformity, but did not make a specific proposal. The FAA believes that the applicant should be allowed to select a climb speed if the airplane meets the minimum gradient and rate of climb at that speed. The proposal to amend § 23.67 is adopted without substantive change.

*Proposal 6–11.* One commentator objected to the application of proposed § 23.75, concerning landing distance requirements, to airplanes of 6,000 pounds or less maximum weight for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3. This commentator also stated that proposed § 23.75(e), concerning wheel brake pressures, is a design requirement and should therefore be placed in Subpart D of Part 23. The FAA does not agree because proposed § 23.75(e) refers to the pressures used in determining the landing performance. The commentator further suggested that the FAA should consider issuing advisory material as to what is considered safe and reliable under proposed § 23.75(f). The wording of proposed § 23.75(f) is the same as that of present § 25.75(b)(3), and this wording has been administered without difficulty for many years. However, the FAA will consider issuing advisory material at a future date if the need is shown.

Another commentator stated that he would not support the inclusion of reverse thrust as an acceptable "other means" of retarding the airplane in determining the landing distance under proposed § 23.75(f), because the landing distance is demonstrated on a dry runway with no provision for a field length factor. The FAA agrees that the effect of wet runways would have to be taken into account in any determination that a means of retarding the airplane is safe and reliable and that consistent results can be expected in service use. It should be noted that proposed § 23.1587(a)(6) (Proposal 6–31), as adopted, requires that the kind of surface used in the landing distance tests be described in the Airplane Flight Manual. The proposal to revise § 23.75 is adopted without substantive change.

*Proposal 6–12.* One commentator objected to the application of proposed § 23.77, concerning balked landing performance, to airplanes of 6,000 pounds or less maximum weight for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3. Proposed § 23.77 is adopted without substantive change.

*Proposals 6–13 and 2–6.* One commentator stated that the option in proposed (and current) § 23.149(a) for the applicant to choose zero yaw or an angle of bank is inconsistent because straight flight with zero yaw (zero sideslip) can only be achieved with some degree of bank. The FAA agrees that bank may be needed to establish straight flight with zero yaw following the failure of a powerplant at low airspeed. The proposed language is the same as that of the current rule and an angle of bank of up to 5 degrees to maintain straight flight has been allowed under the current rule. The directional controllability that must be provided for compliance with §§ 23.147 and 23.205 ensures that bank angles up to 5 degrees under these flight conditions will not be accompanied by excessive yaw angles. Certain design or control features may influence the use of roll control immediately following the failure of a powerplant. Therefore, the proposal (as well as the current rule) allows reference to a zero yaw angle, without bank, for determining the $V_{MC}$ of airplanes which incorporate such features.

Section 23.149(a) is revised in accordance with the discussion of Proposal 6–41 with respect to the modes of failure which must be simulated in demonstrating $V_{MC}$. The revision requires that the method used to simulate critical engine failure must represent the most critical mode of powerplant failure with respect to controllability that is expected in service, rather than (all) modes of powerplant failure expected in service.

Proposal 2–6 to amend § 23.149(b) (Notice 75–10) was reproposed in Proposal 6–13 for the purpose of clarity. No unfavorable comments were received on proposed §§ 23.149 (b), (c), and (d), and they are adopted without substantive change.

*Proposal 6–14.* One commentator objected to the application of proposed § 23.161 to airplanes of 6,000 pounds and less maximum weight for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3.

Since § 23.21(a) requires that each requirement of this subpart must be met at each appropriate combination of weight and center of gravity within the range of loading conditions for which certification is requested, proposed § 23.161(c)(2)(ii) is revised by deleting the reference to center of gravity and proposed § 23.161(c)(2)(iii) is withdrawn.

*Proposal 6–15.* No unfavorable comments were received on the proposal to amend § 23.177. Accordingly, the proposal is adopted without substantive change. For comments related to the proposal to amend § 23.177, see Proposal 6–16.

*Proposal 6–16.* One commentator objected to proposed § 23.181(b), which would require that short period lateral or directional oscillations and combined lateral-directional oscillations ("Dutch roll") be damped to $\frac{1}{10}$ amplitude in 7 cycles. The commentator stated that this proposal is more stringent with regard to combined lateral-directional oscillations than proposed § 25.181 (Proposal 6–43) and that proposed § 25.181 retains certain necessary requirements for other short period oscillations that are not contained in proposed § 23.181. Proposed § 25.181(a) would require that oscillations other than combined lateral-directional oscillations be heavily damped, and proposed § 25.181(b) would require combined lateral-directional oscillations to be positively (but not heavily) damped. The FAA agrees that a similar distinction should be made in § 23.181 between combined lateral-directional ("Dutch roll") oscillations and other longitudinal, lateral, and directional oscillations.

Current §§ 23.177 (a)(4) and (b)(3) (which are deleted by Proposal 6–15) require any short period lateral or directional oscillation to be heavily damped. After considering the comment and after further review, the FAA believes that the current requirement for heavy damping should be retained for short period lateral and directional oscillations other than "Dutch roll" (combined lateral-directional) oscillations. With respect to combined lateral-directional oscillations, the FAA believes that these oscillations do not need to be heavily damped and that the proposed requirement for Part 23 airplanes would provide a satisfactory damping ratio.

The FAA believes the difference between Part 23 and Part 25 requirements with respect to combined lateral-directional oscillations is justified since airplanes certificated under Part 25 have very large variations in size, weight, and moment of inertia, which affect the lateral-directional characteristics and pilot reaction to these characteristics. The FAA therefore believes that it is appropriate that the damping requirement in § 25.181(b) be stated in general terms, as reflected in Proposal 6–43.

The proposal to amend § 23.181 is adopted with the revisions discussed above.

*Proposal 6–17.* Proposed new § 23.183 would establish a limit on the rate of spiral divergence by requiring that the angle of bank may not increase to more than 40 degrees in less than 12 seconds after the controls are released in a 20-degree banked turn under specified conditions. One commentator objected to the proposal stating that no need had been shown for the proposal and that the tests referred to in the notice were not definitive. After comparing available data on the subject of spiral divergence, the FAA believes that rulemaking on this subject is premature. Accordingly, the proposal to add a new § 23.183 is withdrawn.

*Proposal 6–18.* Many comments were received on the proposal to amend § 23.221. In view of the conflicting views expressed in these comments, and after further consideration by the FAA, the FAA believes that the proposal to amend § 23.221 is premature, and it is withdrawn.

*Proposal 6–19.* One commentator stated that the proposal to amend § 23.729(f)(1) is redundant and that the requirement proposed is already in effect. The FAA does not agree with the comment for the reasons stated in the notice.

The proposal to amend § 23.729(f)(1) is adopted as proposed except that the last three words, "the aural warning", of the proposed sentence are replaced with

the words "the warning device" so that the wording of the sentence is consistent with the remainder of § 23.729(f).

For other comments related to the proposal to amend § 23.729, see Proposal 6–51.

*Proposal 6–20.* For comments related to the proposal to revise § 23.1043(b), see Proposal 6–23.

*Proposal 6–21.* One commentator objected to the proposal to amend § 23.1047 for reasons stated in his comments on Proposal 6–3, concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3. The proposal to amend § 23.1047 is adopted without substantive change.

[For discussion concerning new § 23.-1353(g), see Proposals 6–57 and 2–87.]

*Proposal 6–22.* No unfavorable comments were received on the proposal to revise § 23.1501. Accordingly, the proposal is adopted without substantive change.

*Proposal 6–23.* The proposal to revise § 23.1521(e) is one proposal in a series of proposals on powerplant cooling requirements and ambient temperature operating limitations and information for Parts 23, 25, 27, and 29 aircraft. This series consists of proposals 6–20, 6–23, 6–29, 6–52, 6–54, 6–56, 6–68, 6–71, 6–74, 6–82, 6–85, and 6–88.

Proposed § 23.1521(e) in conjunction with proposed § 23.1043(b) (Proposal 6–20) would require that an ambient temperature operating limitation be established as the maximum atmospheric temperature at which compliance with the powerplant cooling requirements is shown. In response to these proposals, one commentator stated that no justification for safety or other reasons has been presented for establishing the proposed operating limitations, and that he believes that no safety justification exists. The commentator also stated that the FAA cooling tests and correction factors are very conservative, that it would be necessary to correct cooling tests to at least the equivalent of 125 degrees F at sea level to avoid restrictive operating limitations, and that this would result in increased cooling drag and poorer performance. Another commentator, in regard to proposed § 27.1521(f) (Proposal 6–71), also stated that an ambient temperature limitation has not been shown to be necessary.

After considering these comments, and after further review, the FAA believes that it does not now have enough information to justify the proposed requirements for reciprocating engines in Part 23 airplanes and Part 27 rotocraft. However, because of the differences between reciprocating and turbine engine installations, particularly in regard to engine components and accessories, and because of the effects of high temperature operation on turbines, Part 23 already requires the establishment of ambient temperature limitations for turbine engines, and for the same reasons the FAA believes that ambient temperature limitations for turbine engines should also be established for Part 27 helicopters. Parts 25 and 29 already require temperature limitations for reciprocating engines (as well as turbine engines) because the reciprocating engines in these aircraft are generally more complex than those used in Part 23 and Part 27 aircraft.

Accordingly, proposed §§ 23.1521(e) and 27.1521(f) are revised to require the establishment of ambient atmospheric temperature limitations for turbine but not for reciprocating engines and proposed §§ 25.1521(e) and 29.1521(e) are adopted without substantive change. In addition, proposed §§ 23.1043(b), 25.1043(b), 27.1043(b), and 29.1043(b), as adopted, are revised to omit the reference to a limitation on the operation of the aircraft, since the establishment of ambient temperature operating limitations is prescribed in proposed §§ 23.1521(e), 25.1521(e), 27.1521(f), and 29.1521(e). For reciprocating engines, §§ 23.1587 and 27.1587 are revised to require that the maximum ambient air temperature for which compliance with the engine cooling requirements was shown must be included in the performance information section of the Flight Manual.

One commentator recommended that the 100-degrees F minimum in proposed § 25.1043(b) be deleted, since the ambient temperature at which compliance with the cooling requirements is shown becomes an operating limitation on the airplane and airworthiness is not affected as long as the limitation is followed. The FAA believes that the 100-degree F minimum is appropriate since a lower temperature would be impractical and unrealistic considering summer operations in the United States. It should be noted that an exception to the minimum is provided for winterization installations.

This commentator also stated that the explanation for proposed § 25.1043(b) implies that only a test demonstration at 100 degrees F or higher is acceptable. This is incorrect. Section 23.1043(a)(1) and corresponding provisions in Parts 25, 27, and 29 clearly indicate that tests may be conducted under other conditions and corrected to the prescribed conditions.

One commentator recommended the deletion of the requirements in proposed §§ 27.1583(b) and 29.1583(b) for an explanation of the powerplant limitations in the Airplane Flight Manual, since such explanations would be redundant. A similar comment was received in response to proposed § 25.1583(b). The intent of the proposals was not to require an explanation of each limitation. A separate explanation would not be necessary for a limitation that is self-explanatory. For clarification, proposed §§ 23.1583(b)(2), 25.1583(b)(2), 27.1583(b)(2), and 29.1583(b)(2) are revised to require an explanation of limitations "when appropriate."

In regard to proposed § 23.1583(b), one commentator stated that contrary to the FAA statement in the notice, the establishment of the test temperature as a limitation has not been required in the past and should not be a limitation. The FAA disagrees. Current § 23.1583(j) requires that, for turbine engines, the temperatures used in the climb test prescribed in § 23.1043(b)(2), be furnished as operating limitations in the Airplane Flight Manual. Proposed § 23.1583(b) merely makes it clear that any operating limitations that are established under § 23.1521 must be furnished in the Airplane Flight Manual. In view of the adoption of proposed § 23.1583(b) as revised, § 23.1583(j) is deleted and marked "Reserved."

With regard to the proposal to amend § 25.1583 (Proposal 6–56), one commentator recommended the deletion of proposed paragraph (b)(3) concerning powerplant limitations, and paragraph (i) concerning maneuvering load factors. The commentator stated that if the engine instrument markings have to be changed, it should be handled by a service bulletin. The FAA does not agree. The relation between the powerplant limitations and the instrument markings should be explained in the Manual. The commentator also stated that the load factor (number) is meaningless to the pilot as he cannot determine what it is during a pull-up maneuver. He stated that correlation with bank angle is acceptable, but that transport aircraft do not exceed 60 degree bank angles. The FAA believes that the maneuvering load factor should be retained in the Flight Manual because it is established as an operating limitation under § 25.1531, and the correlation with bank angle provides useful information to the pilot concerning the strength limitations of the airplane.

The proposals to amend §§ 23.1583, 25.1583, 27.1583 and 29.1583 are adopted with the revision discussed above.

For consistency in the terminology used in the cooling tests requirements, a nonsubstantive change is being made to §§ 23.1043(a)(1), 23.1043(d), 27.1043(a)(1), 27.1043(d), 29.1043(a)(1), and 29.1043(d) by deleting the words "maximum anticipated air temperature" and inserting in their place the words "maximum ambient atmospheric temperature".

*Proposal 6–24.* One commentator objected to proposed § 23.1523, which concerns the establishment of the minimum flight crew, stating that it is not necessary to make all aircraft conform to the requirements of Part 25. The FAA believes that proposed § 23.1523 specifies the appropriate requirement that should be considered in determining the minimum flight crew for Part 23 airplanes.

Another commentator said that specification of minimum crew is an operational item that may vary with the type of operation, e.g., for compensation or hire which by law must be conducted in accordance with the highest standards. He concluded that rules specifying the number of crew members for specific operations should be in the operating regulations. The FAA agrees that certain rules concerning the number of crew members properly belong in the operat-

ing rules, and this is done, for example, in Subpart M of Part 121. However, under current § 23.1523, the minimum crew is established for VFR only, without requiring consideration of the additional crew duties that arise when IFR operations are authorized. These duties may be imposed by the design and operating characteristics of the aircraft and by its installed equipment. The FAA believes that they must therefore be evaluated during the type-certification process. The proposal to revise § 23.1523 is adopted without substantive change.

*Proposal 6–25.* One commentator objected to proposed § 23.1541 concerning placards in airplanes of 6,000 pounds or less maximum weight for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3. Proposed § 23.1541 is adopted without substantive change.

*Proposal 6–26.* One commentator objected to proposed § 23.1559 concerning placards in airplanes of 6,000 pounds or less maximum weight for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of those comments, see Proposal 6–3. Proposed § 23.1559 is adopted without substantive change.

*Proposal 6–27.* Proposed § 23.1567(b)(2) would require that utility category airplanes that do not meet the spin requirements for acrobatic category airplanes have a placard in clear view of the pilot stating "Spins prohibited." One commentator said that the proposal is redundant and would add to the already confusing proliferation of cockpit placards. The FAA does not agree since the proposal would prevent any possible confusion as to whether a particular utility category airplane has been approved for spins. The proposal is adopted without substantive change.

*Proposals 6–28, 2–39, 2–43, and 2–45.* Proposed § 23.1581(a) is revised in accordance with the discussion of the proposal to amend § 25.1581 (Proposal 6–55). For another comment related to Proposal 6–28, see Proposal 6–3.

Disposition of Proposal 2–39 to add a new § 23.1353(f) (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–28. For comments related to proposed § 23.1353(f) and for an explanation of the revision to proposed § 23.1353(f), see the discussion of Proposal 2–87 under Proposal 6–57. Disposition of Proposal 2–45 to revise § 23.1581(b) and to add a new § 23.1581(d) (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–28.

One commentator, who agreed in general with proposed § 23.1581(b), recommended several clarifications. He indicated that the title "Pilot's Operating Handbok" should be allowed as an alternative to "Airplane Flight Manual." The FAA has no objection to the title "Pilot's Operating Handbook" if the title page also includes a statement indicating that the document is an FAA-required Airplane or Rotorcraft Flight Manual.

The commentator also indicated that the FAA should delete any requirement for individual page approval for operating limitations in Handbooks that meet a specification acceptable to the Administrator. Proposed § 23.1581(b)(1) would require approval of each page containing the prescribed operating limitations whereas current § 23.1581(b) requires that each part of the Airplane Flight manual containing information presented in §§ 23.1583 through 23.1589 be approved.

The intent of proposed §§ 23.1581(b)(1) and (b)(2) was to require that the presentation of operating limitations be approved by the FAA and be clearly identified as such while at the same time providing an option for the presentation of the other required information. This option would have provided that each page containing the information prescribed in §§ 23.1585 through 23.1589 had to be determined in accordance with the applicable requirements of this part and had to be approved or the information presented in its entirety in a manner acceptable to the Administrator.

In light of the comments received and after further review, the FAA believes that this intent will be accomplished in a simpler manner, and will be more consistent with Parts 25, 27, and 29 flight manual requirements, by retaining the current requirements and providing an alternative to the current requirements in a separate paragraph which provides that each part containing operating limitations must be approved and limited to such information, and the information prescribed in §§ 23.1585 through 23.1589 must be determined in accordance with the applicable requirements of this part and presented in a manner acceptable to the Administrator. Proposed §§ 23.1581 (b)(1) and (b)(2) are revised to reflect the changes discussed above.

The references in proposed §§ 23.1581 (b)(1) and (b)(2) to the information prescribed in §§ 23.1581(c) (paragraph (a)(2) as adopted) have been deleted to be consistent with the flight manual requirements of Parts 25, 27, and 29.

One commentator objected to Proposal 2–45 on the grounds that procedures, performance data, and loading information for any airplane certificated under Part 23 would not have to be approved by the FAA. This comment evidently refers to proposed § 23.1581(b)(2)(i) (which is incorporated into paragraph (b)(2) as adopted), under which the information prescribed in §§ 23.1585 through 23.1589 would not be identified as FAA-approved, if this information in its entirety is presented in a manner acceptable to the Administrator. The FAA does not agree with the comment. Under the proposal, the information would have to be determined in accordance with the applicable requirements of Part 23. In finding that a manual is acceptable, the FAA would review the manual to determine that the required information is complete and accurate. The manual would also be reviewed to ensure that any additional information provided by the applicant is not in conflict with required information or contrary to the applicable airworthiness requirements. The FAA believes that § 23.1581(b)(2) will provide an adequate method of review of the information prescribed in §§ 23.1585 through 23.1589.

The proposals to amend § 23.1581 are adopted with the revisions discussed above.

Disposition of Proposal 2–43 to amend § 23.1555 (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–28. No unfavorable comments were received on Proposal 2–43, however, proposed § 23.1555(c)(3) is revised by deleting the words "and in the Airplane Flight Manual" in view of the requirements of §§ 23.1581 and 23.1587(a)(2), as adopted.

*Proposal 6–29.* For comments related to the proposal to revise § 23.1583(b), see Proposal 6–23.

*Proposal 6–30.* One commentator objected to the application of proposed § 23.1585, concerning operating procedures, to airplanes of 6,000 pounds or less maximum weight for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3.

The proposal to amend § 23.1585 is adopted without substantive change.

[For discussion concerning new § 23.1585(e), see Proposals 6–57 and 2–87.]

*Proposals 6–31 and 2–46.* One commentator objected to the application of proposed § 23.1587, concerning performance information, to airplanes of 6,000 pounds or less maximum weight for reasons stated in his comments on Proposal 6–3 concerning Flight Manuals. For a discussion of these comments, see Proposal 6–3.

Another commentator stated, in response to proposed § 23.1587(a)(7), which would require information on the steady rate or gradient of climb, that if gradient data are presented, conversion charts should be included, and that ideally each determination should be available; however, he concluded that the option of one or the other should be deleted and a definite requirement adopted. The commentator misinterpreted the proposed requirement. Section 23.65(c), as adopted by this amendment, requires the determination of a gradient of climb for turbine engine powered airplanes. Proposed § 23.1587(a)(7) is worded so as to take into account the requirement of § 23.65(c), not to provide an option for the applicant, i.e., whether gradient of climb or rate of climb is furnished under § 23.1587(a)(7) will be determined by the applicable requirement of §§ 23.65 and 23.77.

Section 23.1587 is adopted as proposed, except that a new § 23.1587(a)(9) has been added to include information on the maximum ambient temperature at which compliance with the cooling requirements is shown for reciprocating engines. This addition is explained in the discussion of the comments on Proposal 6–23.

Disposition of Proposal 2–46 (Notice 75–10), which proposed to delete the second sentence of present § 23.1587(a)(2), was deferred so it could be considered with Proposal 6–31. No unfavorable comments were received on Proposal 2–46. Proposal 2–46 was reproposed in Proposal 6–31, and is adopted without substantive change with the adoption of Proposal 6–31.

*Proposal 6–32.* Proposed new § 25.21(f) would require that when surface winds must be considered, the wind velocity must be measured at or corrected to a height of 10 meters above the surface, because the National Weather Service is standardizing on a height of 10 meters for reporting winds at airports. One commentator said that since the purpose of the proposal is standardization of Airplane Flight Manual performance information with respect to reported winds for takeoff or landing in service operations, the requirement should be placed in the flight manual requirements under § 25.1587(c)(1)(i) instead of in § 25.21. The FAA agrees that this is one purpose of the proposal but there are flight requirements other than those concerning performance information that require consideration of surface winds. Therefore, the FAA believes that it is more appropriate to include the proposed requirement in § 25.21. However, proposed § 25.21(f) is revised to clarify its applicability.

The proposed change to § 25.21(d), which deals with tolerances for variables in flight testing, would delete the requirement that the tolerance on wind during takeoff and landing tests must be based on the wind measured at a height of 6 feet above the runway. The commentator said that performance analysis is usually based on winds at the height of the mean aerodynamic center of the airplane above the runway surface, and that the data in the Airplane Flight Manual is then corrected to the currently used height of 50 feet. The commentator recommended that this procedure be continued, except that the wind velocities in the Flight Manual should be based on a height of 10 meters instead of 50 feet. The FAA believes that the proposed deletion of the 6-foot height from § 25.21(d), together with proposed § 25.21(f), lbs revised, would allow continued use of the procedure recommended by the applicant.

The commentator also suggested that the correction chart in Civil Aeronautics Manual 4b Appendix A, Figure 2, be considered for inclusion in Part 25. The FAA does not believe that it is necessary to include this information in the rules.

The proposal to amend § 25.21 is adopted with the revisions discussed above.

*Proposal 6–33.* For comments related to the proposal to amend § 25.29, see Proposal 6-5.

*Proposal 6–34.* Several commentators objected to the method of computing $V_1$ (takeoff decision speed) in proposed § 25.107(a) on the grounds that—(1) the speed increment between $V_{EF}$ (engine failure speed) and $V_1$ should not be determined with all engines operating because the accelerate-stop distance determined under proposed § 25.109(a) would then be unnecessarily large for the critical engine failure condition (especially for twin-engine airplanes); and (2) placing the 2.0-second time delay between $V_{EF}$ and $V_1$ in proposed § 25.107(a)(2)(ii) does not adequately provide for hetse instances in which the pilot may have to analyze and react to an event that occurs immediately before reaching $V_1$.

It was recommended that proposed § 25.107(a) be revised so that $V_1$ is determined by adding to $V_{EF}$ the speed gained with the critical engine inoperative during the time interval between the instant at which the critical engine is failed and the instant at which the test pilot recognizes and reacts to the engine failure, as indicated by the pilot's application of the first retarding means during accelerate-stop tests (the 2.0-second minimum time delay that was proposed to be included between $V_{EF}$ and $V_1$ would be deleted). It was further recommended that proposed § 25.109(a) be revised so that a 2.0-second time delay following $V_1$ is incorporated into the determination of accelerate-stop distances, as follows: (1) for the engine failure case, the acceleration of the airplane from $V_{EF}$ would be with the critical engine inoperative and would continue for 2.0 seconds after reaching $V_1$; and (2) for the other event case, the acceleration of the airplane would be with all engines operating and would continue for 2.0 seconds after reaching $V_1$.

After considering all of the comments on these proposals and after further review, the FAA agrees with these comments and the recommendations. The FAA believes that the recommended revisions would provide for events other than engine failure, even though the speed increment between $V_{EF}$ and $V_1$ would be determined with the critical engine inoperative instead of all engines operating, because the accelerate-stop distance for the other event case would be determined with all engines operating from the start of takeoff until 2.0 seconds after $V_1$ is reached. Further, the FAA believes that deleting the 2.0 second minimum time delay from the determination of $V_1$ and inserting a 2.0-second delay after $V_1$ in the determination of the accelerate-stop distance would be more appropriate for most rejected takeoff situations, since stopping requires a positive decision and action by the pilot. Proposed §§ 25.107(a) and 25.109(a) are revised accordingly.

Several commentators objected to the 2.0-second (minimum) time delay used in computing $V_1$ under proposed § 25.107(a)(2)(ii) on the grounds that it would increase the required take-off runway lengths, particularly in the engine failure case, and that such increases are not justified. One commentator recommended that the time delay be reduced to 1.0 second. The revisions discussed above significantly reduce the effect of the 2.0-second time delay on the required accelerate-stop distance in the engine failure case. Under § 25.107(a) as proposed, the airplane would be accelerated to a $V_1$ speed equal to $V_{EF}$ (engine failure speed) plus the speed gained with all engines operating during a total time interval of about 3 seconds (i.e., during the time required for the test pilot to recognize and react to an engine failure in accelerate-stop tests, plus a 2.0-second time delay for service operations). Under proposed § 25.109(a), the accelerate-stop distance for the engine failure case would be determined by accelerating the airplane from $V_{EF}$ to the $V_1$ speed determined under proposed § 25.107(a), but with the critical engine inoperative instead of with all engines operating. As pointed out by one of the commentators, the total time interval between engine failure and application of the first retarding means could then become about 6 seconds for a twin-engine airplane in the engine failure case, and the distance traversed during the additional 3 seconds (beyond the time interval prescribed in § 25.107(a)) would be included in the accelerate-stop distance. However, under the revisions incorporated in §§ 25.107(a) and 25.109(a) as adopted, the revised $V_1$ speed is equal to $V_{EF}$ plus the speed gained with the critical engine inoperative during the test pilot's recognition-reaction time interval with no further time delay. The accelerate-stop distance for the engine failure case is then determined by accelerating the airplane with one engine inoperative from $V_{EF}$ to the revised $V_1$ speed and then for an additional 2.0 seconds, before the first retarding means is applied. Under these revisions, a 2.0-second allowance for time delays in service operation is retained, but the total time interval between $V_{EF}$ and application of the first retarding means in the engine failure case would be significantly reduced (for example the reduction could be from about 6 seconds to about 3 seconds for a twin engine airplane). The accelerate-stop distance for the engine failure case would be reduced accordingly. The FAA does not believe that any further revision is warranted because the 2.0-second delay (incorporated into § 25.109 as adopted rather than § 25.107) is necessary to allow for a surprise element and other operational factors not covered in accelerate-stop tests.

One commentator proposed that $V_1$ speeds be established as recognition speeds for both engine failure and other event cases. However, it is not clear how a recognition time for "other events" would be determined since there is a large variety of possible events that could lead to a rejected takeoff.

Another commentator, in addition to suggesting changes similar to those already made as discussed above, recommended that $V_1$ be established as a failure recognition speed which would be determined by adding to the speed at which the initial failure is assumed to

occur, the time between the failure and the pilot's recognition of the failure (assumed to be 2.0 seconds before his reaction to the failure), and the time, not less than 2.0 seconds, to allow for time delays in service under reasonably unfavorable operating conditions. The FAA does not agree that there should be a 2.0-second minimum delay, regardless of the pilot's actual reaction time, in determining $V_1$ under § 25.107(a), because proposed § 25.109(a) as revised will require that the accelerate-stop distance computations include acceleration of the airplane for 2.0 seconds after $V_1$ is reached.

This commentator further proposed that closing of the throttles be specified in proposed § 25.109 as the first action to be taken in stopping the airplane, with subsequent actions at intervals of not less than one second. Current § 25.101(h) already requires that the procedures used in determining the accelerate-stop distance must be able to be consistently executed in service by crews of average skill, and must include allowance for any time delays in the execution of the procedures that may be reasonably expected in service. The order in which the retarding devices are applied and the subsequent time delays will be established during type certification under the general provisions of § 25.101(h).

One commentator objected to the requirement in proposed § 25.107(a) that $V_{EF}$ may not be less than $V_{MCG}$ (minimum control speed on the ground) determined under (proposed) § 25.149(e). The commentator stated that it should only be required that $V_1$ not be less than $V_{MCG}$ because if an engine failure is recognized between $V_{EF}$ and $V_1$ the takeoff should be aborted. However, under proposed § 25.107(a) and 25.109(a), as revised $V_1$ will be placed at the speed at which the test pilot recognizes and reacts to an engine failure during accelerate-stop tests and the 2.0-second time delay will be inserted after $V_1$ instead of between $V_{EF}$ and $V_1$ as proposed. This revision allows $V_1$ to be very close to $V_{EF}$. Therefore, the effect on takeoff and accelerate-stop distances of requiring that $V_{EF}$ not be less than $V_{MCG}$ has been significantly reduced because of the deletion of the minimum 2.0-second delay between $V_{EF}$ and $V_1$. In addition, the FAA believes that $V_{EF}$ should not be less than $V_{MCG}$ so that there will be at least a small margin between $V_{MCG}$ and $V_1$ to ensure controllability of the airplane at $V_1$.

One commentator recommended that the proposals containing $V_1$ and accelerate-stop distances be made retroactive to existing transport category airplanes one year after the date of their adoption. Current § 25.101(h) already provides that the procedures used in determining accelerate-stop distances include allowance for time delays reasonably expected in service. The purpose of the present proposals is to clarify and standardize the method of including an appropriate time delay in the accelerate-stop performance determination for airplanes type certificated in the future.

In regard to proposal 6–2, which would change the definition of $V_1$ in § 1.2 from "critical engine failure speed" to "takeoff decision speed," one commentator considered the proposed definition to be inadequate because "decision" is an undefined quantity. The commentator recommended that the proposal be revised to state that $V_1$ means the speed at which the flight crew has recognized an engine failure or other event and takes action either to reject or continue the takeoff. The significance of $V_1$ with respect to accelerate-stop distance, takeoff distance, and the related operating procedures is explained in the Airplane Flight Manual and the FAA believes it is too complex to be completely described in a brief definition in § 1.2. Accordingly, the proposed amendment of § 1.2 is adopted without substantive change.

The proposals to revise §§ 25.107(a) and 25.109(a) are adopted with the revisions discussed above.

*Proposal 6–35.* One commentator stated that if the intent of proposed §§ 25.107 (d) and (e)(1)(iv) with respect to the engine-out $V_{MU}$ is to ensure controllability, the $V_R$–5 tests required by § 25.107(e)(3) should be expanded to require the test over the full range of certification conditions and all references to one-engine-inoperative $V_{MU}$ should be deleted from §§ 25.107(d) and (e). The FAA does not agree with this recommendation because it would ignore the performance aspects (thrust-to-weight ratio) of the one-engine-inoperative $V_{MU}$ demonstration.

Another commentator stated that flight test experience has shown that trim and control drag is accounted for with the thrust/weight ratio corresponding to the one-engine-inoperative condition used in the test, and that actual engine-out $V_{MU}$ tests result in the same $V_{MU}$ as tests conducted at the simulated engine-out thrust-to-weight ratio. The FAA agrees, and the last sentence of proposed § 25.107(e)(iv) is deleted. The proposal to amend § 25.107 is adopted with the revision discussed above.

*Proposal 6–36.* For comments related to proposed § 25.109(a), see Proposal 6–34.

*Proposal 6–37.* One commentator agreed with the proposed change to § 25.111(a)(2), which would delete the reference to $V_1$ and substitute $V_{EF}$ in its place to make § 25.111(a) consistent with proposed § 25.107(a) (Proposal 6–34). However, this commentator did not agree with making the same change to § 25.111 (a)(3), and said that the present reference to $V_1$ in that paragraph is correct for the new definition of $V_1$ (i.e., as defined in proposed §§ 1.2 and 25.107(a)). The FAA does not agree with the comment on proposed § 25.111(a)(3) because it would leave a gap in the requirements for the speed range between $V_{EF}$ and $V_1$.

Accordingly, the proposal to amend §§ 25.111 (a)(2) and (a)(3) is adopted without substantive change.

*Proposal 6–38.* Proposed § 25.121(e) would require the determination of the vertical distance required to make a transition from a 3-degree descent path in the landing configuration with the critical engine inoperative to a stabilized climb condition. Several commentators stated that the vertical distance determined in this manner should not be considered a minimum decision height for approaches. The FAA agrees, since the establishment of decision height requires consideration of many operational factors. Some commentators stated that the landing configuration in the proposal is not appropriate for one-engine-inoperative approaches. One commentator recommended that the horizontal as well as the vertical distance for transition to approach climb be determined, and referred to the work of the ICAO Obstacle Clearance Panel on this subject. Another commentator recommended that the required determination take into account the minimum control speed, $V_{MC}$. In light of the comments received, and after further review, the FAA believes that proposal 6–38 should be withdrawn.

*Proposal 6–39.* Several commentators objected to the proposal to amend § 25.123(a) on the ground that current § 25.123(a) is conservative and has the advantage of greater simplicity. The FAA agrees and the proposal to amend § 25.123(a) is therefore withdrawn.

*Proposal 6–40.* One commentator recommended that proposed § 25.143(b) be withdrawn and that current §25.143(b) be retained on the ground that there are areas within the flight envelope from takeoff to landing where the failure of a second engine cannot be handled smoothly and safely. The commentator also stated that the proposed amendment is vague and could produce confusion with respect to time between failures, and that it could be interpreted to require a combination of double engine failure and configuration changes. The FAA agrees that the proposed rule requires some clarification, but does not believe that the current § 25.143(b) should be retained. With respect to failure of a second engine on airplanes with three or more engines, the FAA believes that failure of a second engine can be reasonably expected in the enroute, approach, and landing stages of flight after failure of one engine earlier in the flight.

Therefore, proposed § 25.143(b) is revised to require consideration of the sudden failure of the second critical engine when the airplane is in a trimmed condition with one engine inoperative in the enroute, approach, and landing configurations. This revision also clarifies the requirement with respect to time between engine failures by providing that the airplane is in a trimmed condition with one engine inoperative when the second engine is failed. In regard to combination of engine failure and configuration changes, it should be noted that the introductory sentence of proposed § 25.143(b) refers to "probable operating conditions," and that some change of configuration may be desirable after engine failure, e.g., retracting the landing gear for a go-around after engine failure in the landing configuration.

Another commentator considered the proposed configuration change requirement to be too general and vague and suggested that the proposed requirement contain certain specific criteria. The commentator also recommended that interpretative material be included in the rule or in the associated Flight Test Guide. The FAA does not agree. The FAA believes that the wording of the proposed rule is clear and would accomplish the intended purpose.

The proposal to amend § 25.143(b) is adopted with the revision discussed above.

No unfavorable comments were received on the proposal to amend § 25.143 (c), which would reduce the maximum allowable rudder force for temporary application in meeting the controllability requirements, from 180 pounds to 150 pounds. Accordingly, the proposal is adopted without substantive change. For consistency with § 25.143(c), as adopted, and since flight test experience has shown that 180 pounds may make control difficult for some pilots under some flight conditions, § 25.147(a) is amended by deleting the reference to "180 pounds" and inserting in its place "150 pounds".

*Proposal 6–41.* One commentator recommended deletion of proposed § 25.149 (a), which would require that the method used to simulate critical engine failure must represent the modes of powerplant failure expected in service. The FAA does not agree. This provision is necessary to ensure that the most adverse condition with respect to controllability is considered. To clarify this intent, § 25.149(a) is revised to require consideration of the most critical mode of powerplant failure with respect to controllability expected in service. This commentator objected specificaly to dynamic engine cut demonstrations because of the hazards involved. The FAA believes that dynamic effects should be considered during type certification, since they might occur in service operations.

Upon further review, the FAA believes that specific guidance as to the setting of the propeller on propeller-driven airplanes is necessary with regard to proposed § 25.149(c). Current § 25.149(b) (8) specifies the setting of the propeller for reciprocating engine-powered airplanes. Current § 25.149(c) (5) specifies that for turbine engine-powered airplanes, the airplane must be ". . . in the most critical takeoff configuration existing along the flight path . . ." and has been administered to require that the setting of the propeller of turbine engine-powered, propeller-driven airplanes be the same as that specified in current § 25.149(b) (8). Accordingly, current § 25.149(b) (8) is retained and redesignated § 25.149(c) (7), to be applicable to all propeller-driven airplanes.

One commentator stated that the pilot should be provided with information regarding the effects of bank angle on $V_{MC}$. The FAA does not have enough information at this time to justify the suggested requirement.

Proposed § 25.149(e) would require the determination of a minimum control speed on the ground, $V_{MCG}$, for use in establishing takeoff speeds under proposed § 25.107 (see Proposal 6–34). One commentator recommended that the second sentence of proposed § 25.149(e) be revised to read "During this demonstration, the permissible lateral deviation of the path of the airplane would be limited to 30 feet." He said that the revision would eliminate the possibility of misinterpretation. The FAA believes that the language of the proposal is clear; however, it may be too restrictive in requiring the ground track to be parallel to or converging toward the centerline of the runway when the airplane is rotated for takeoff, and thereby unnecessarily delay rotation in determining takeoff performance under §§ 25.107(e) and 25.111. Section 25.149(e) is therefore revised to state that the airplane's path, from the point at which the critical engine is made inoperative to the point at which recovery to a direction parallel to the runway centerline is completed, may not deviate more than 30 feet laterally from the centerline. The adopted rule would allow the airplane to be rotated for takeoff before recovery to a direction parallel to the runway centerline is completed; however, it should be noted that it requires that $V_{M3_G}$ most be determined to enable the takeoff to be safely continued using normal piloting skill. The commentator also recommended that proposed §§ 25.149 (e) (3) and (e) (5) be deleted because flight tests have proven that gross weight and center of gravity have no effect on $V_{MCG}$. The FAA does not agree. The airplane's acceleration varies with its weight, and this may affect directional control and lateral deviation. The center-of-gravity location may also affect directional stability and control on the ground.

One commentator stated that proposed § 25.149(e) would allow a lateral deviation of 30 feet during the determination of $V_{MCG}$, whereas the current FAA Flight Test Handbook recommends 25 feet and the Air Force requires 25 feet. The commentator recommended that 25 feet be specified in the adopted rule. The FAA believes that the 30-foot deviation limit will assist in international standardization in this area. In addition it should be noted that § 25.107(a) (1) as adopted (see discussion of Proposal 6–34) requires $V_{EF}$ to be not less than $V_{MCG}$ and $V_1$ to be greater than $V_{EF}$, thus providing a small controllability margin at $V_1$.

Several commentators recommended that the proposal be revised to allow the use of nose wheel steering in the determination of $V_{MCG}$ under § 25.149(e), if control is through the rudder pedals and the demonstration is made on a wet runway. The FAA does not agree. The effectiveness of nose wheel steering depends to a large degree on runway friction characteristics and the load on the nose wheel. Certification tests on a wet runway would not cover the more extreme slippery runway conditions or all possible variations in takeoff conditions and techniques likely to occur in service. The FAA therefore believes that $V_{MCG}$ should be determined without the use of nose wheel steering, as stated in proposed § 25.149(e).

In regard to the airplane configuration used in determining $V_{MCG}$, one commentator recommended that proposed § 25.149(e) (1) be revised to specify each takeoff configuration instead of the most critical takeoff configuration, to allow a separate $V_{MC_G}$ for different flap settings. The FAA agrees that an applicant should be allowed to determine a separate $V_{MCG}$ for different takeoff configurations but believes that the applicant should also have the option of determining a $V_{MCG}$ value for only the most critical takeoff configuration. Proposed § 25.149(e) (1) is revised accordingly.

Proposed § 25.149(e) (2) would require that $V_{MCG}$ be determined with maximum permissible takeoff power or thrust on the operating engines; however, the word "permissible," in relation to power or thrust, is not defined or used elsewhere in the performance and flight characteristics requirements. For consistency with §§ 25.101(c) and 25.149(c) (1), the word "permissible" is replaced by "available" in § 25.149(e) (2) as adopted. It should be noted that § 25.101(c) refers to the propulsive thrust available under the particular flight condition and thus provides for any difference between the takeoff thrust set during takeoff and the thrust available in flight for a go-around.

Proposed §§ 25.149 (f), (g), and (h) would require the determination of two new minimum control speeds, $V_{MCL}$ and $V_{MCL-2}$, associated with an engine failure during landing approaches that are initiated with all engines operating and with one engine inoperative, respectively. One commentator said that these proposals are inconsistent with the $V_{MCL}$ definitions being considered in the development of wet runway landing performance rules. The commentator recommended that these proposals be deleted until an acceptable rational landing rule is established. Another commentator stated that $V_{MCL}$ and $V_{MCL-2}$ would serve no useful purpose and may confuse flight crews. The FAA does not agree with these comments. These proposals are intended to cover the controllability aspects of an engine failure during landing approach. Proposed § 25.149 (f) as revised is intended to determine a minimum control speed for the situation where an engine fails after power or thrust has been increased to make a go-around from an approach with all engines operating. For airplanes with three or more engines, proposed §§ 25.149 (g) and (h) as revised are intended to determine a minimum speed for maintaining safe control during the power or thrust changes that are likely to be made following the failure of a second engine during an approach initiated with one engine inoperative. The

FAA believes that these proposals, with revisions discussed, should be adopted at this time to provide information for use in pilot training and service operations.

One commentator noted that proposed §§ 25.149(f)(5), (g)(5), and (h)(2) specify "maximum permissible power" in the determination of $V_{MC_L}$ and $V_{MC_{L-2}}$. The commentator recommended that this be changed to "takeoff or maximum permissible power" as used in present § 25.149. Another commentator said that it is not clear whether "maximum permissible thrust" in proposed §§ 25.149 (f), (g), and (h) means maximum takeoff (or contingency) thrust, or whether a lower thrust can be scheduled. This commentator also stated that takeoff (or contingency) thrust would represent an increase in severity with respect to both the British Civil Air Regulations and present § 25.149(d), and that the thrust to be associated with recovering control following a sudden engine failure in §§ 25.149 (f) and (g) should be the power required for a 3-degree approach, and the thrust range to be associated with maintaining straight flight thereafter should be from minimum power to power for level flight or maximum power, whichever occurs first.

As explained in the preceding discussion of § 25.149(e)(2), current § 25.149 (c)(1) uses the words "maximum available takeoff power or thrust". The FAA believes that, for $V_{MCL}$, the power or thrust condition at the time of engine failure should be the thrust associated with a go-around and therefore believes that maximum available takeoff power or thrust should be prescribed in § 25.149 (f) since the approach climb requirements in § 25.121(d) allow use of available takeoff power or thrust. Proposed § 25.149(f) is revised accordingly.

However, since there are no performance requirements for a go-around with two engines inoperative, the FAA believes that the initial power condition at the time of failure of the second engine in § 25.149(g) for $V_{MC_{L-2}}$ should be that for a 3-degree approach with one engine inoperative. This is one of the initial power conditions prescribed in proposed § 25.149(h). In regard to the maximum power or thrust to be applied after the second engine is made inoperative, the FAA believes that the value of $V_{MC_{L-2}}$ to be furnished as information to the pilot should be based on the power or thrust that provides the maximum performance capability of the airplane without exceeding the powerplant limitations, i.e., maximum available takeoff power or thrust at the upper end of the range, and minimum available power or thrust at the lower end of the range. Proposed § 25.149(g) is revised accordingly.

Since $V_{MC_L}$ will be determined with maximum available takeoff power, proposed § 25.149(h) is revised so that the requirement of changing the power on the operating engines after failure of the critical engine only applies to $V_{MC_{L-2}}$.

One commentator said that the critical weight for $V_{MC_L}$ can be the lowest weight, when a 5-degree bank angle is used, and he therefore recommended that proposed §§ 25.149 (f)(4) and (g)(4) be revised to specify the most unfavorable weight in the range of landing weights, instead of the maximum sea level landing weight (or any lesser weight necessary to show $V_{MC_L}$). The FAA agrees that light weight may be critical for $V_{MC_L}$ or $V_{MC_{L-2}}$ but does not believe that the recommended wording change is necessary. The proposal is consistent with current § 25.149(c)(4), and light weight conditions are considered under the current rule.

One commentator stated that the proposal requres determination of $V_{MC_L}$ and $V_{MC_{L-2}}$ but does not appear to require that this information be made available to flight crews or that it be used in determining the approach speed. The commentator recommended that the proposal be changed to require that $V_{MC_L}$ and $V_{MC_{L-2}}$ be included in the Airplane Flight Manual and also that the landing performance requirements in § 25.125 be amended to take account of $V_{MC_L}$. The FAA does not have sufficient information to justify changing the landing performance requirements in the manner recommended by the commentator. However, information regarding $V_{MC_L}$ and $V_{MC_{L-2}}$ would be required to be furnished in the Airplane Flight Manual pursuant to the provisions of § 25.1585(a)(1).

For a comment related to the clause "either with zero yaw or with an angle of bank of not more than 5 degrees", which is contained in proposed §§ 25.149 (e), 25.149(f), and 25.149(g), see Proposal 6–13.

The proposal to amend § 25.149 is adopted with the revisions discussed above.

*Proposal 6–42.* One commentator stated that the exception in proposed § 25.177(b)(2) for the speed range from $V_{MO}/M_{MO}$ to $V_{FC}/M_{FC}$ should also be applicable to the speed range from 1.2 $V_{S_1}$ to $V_{MO}/M_{MO}$. The FAA does not agree. $V_{MO}/M_{MO}$ is the maximum operating limit speed. Gradual divergence that is easily recognizable and controllable by the pilot is allowed in the speed range above $V_{MO}/M_{MO}$ because it is expected that operation at speeds above $V_{MO}/M_{MO}$ will occur only for brief periods and that flight control demands will in general be limited to the restoration of flight at speeds below $V_{MO}/M_{MO}$.

Accordingly, the proposal to revise § 25.177(b) is adopted as proposed except that a provision for maximum flap extended speed and maximum landing gear extended speed has been added for clarification and consistency with the present rule.

*Proposal 6–43.* Proposed § 25.181(b) would require that combined lateral-directional ("Dutch roll") oscillations be positively damped, i.e., diminish after a disturbance, but it does not specify the degree of damping. One commentator recommended that the proposal be revised to state that lateral-directional oscillations should be damped but that neutral damping or mild divergence would be acceptable if it is easily controllable by the pilot. The commentator said the proposal is unnecessarily restrictive following the failure of a stability augmentation device, since the device must be designed to meet § 25.21(e), and that the damping required should be related to the frequency and amplitude of the oscillation, the pilot tasks, and environmental effects. The commentator also said that, if unsatisfactory damping following a failure is confined to an avoidable flight area or configuration and is controllable to return the aircraft to a satisfactory condition for safe flight, the lack of appreciable positive damping may be acceptable. The FAA does not agree with this recommendation. Current § 25.181 requires any short period oscillation to be heavily damped, and the proposal would require that combined lateral-directional oscillations be positively damped instead of heavily damped. The change recommended by the commentator would increase the pilot's tasks and could result in an unsafe situation when operating in rough air. Section 25.672(c) already allows degradation of stability and other flight characteristics after any single failure in a stability augmentation system if the airplane is safely controllable and the resulting stability characteristics allow continued safe flight and landing.

Another commentator recommended that the proposal should be changed to raise the lower limit of the speed range for positive stability from the stalling speed to 1.2$V_{S_1}$. The proposal is the same as the current rule with respect to the lower speed limit of the speed range for positive stability and the FAA does not have sufficient information at the present time to justify raising the lower speed limit to 1.2 $V_{S_1}$.

The proposal to revise § 25.181 is adopted without substantive change.

*Proposal 6–44.* One commentator recommended that the proposal to amend § 25.201 and the proposal to amend § 25.207 (Proposal 6–45) be withdrawn in light of current FAA studies on landing distances which may result in a new stall requirement. The FAA does not agree with this recommendation because the proposals for §§ 25.201 and 25.207 deal with stall demonstration and stall warning, and current studies for the landing distance rules do not include changes to §§ 25.201 or 25.207.

Another commentator stated that many modern airplanes are accepted as having correct stalling characteristics even though these occur before reaching the angle of attack for maximum lift, and suggested that the phrase "at an angle of attack measurably greater than that for maximum lift" be deleted from proposed § 25.201(d)(1). Proposed § 25.201 (d)(2) sets forth an exception to the requirements of proposed § 25.201(d)(1)

(this would be a relaxation of the requirement in current § 25.201(c)(2) with respect to those instances in which the airplane may be considered to be stalled). The FAA does not believe any further relaxation would be justified.

One commentator expressed concern that proposed § 25.201 might result in unwarranted increases in operational speeds and runway length requirements; however, no explanation of this comment was provided. Some operating speeds are affected by stalling speeds which are determined under §§ 25.103, 25.203, and 25.201. Proposed § 25.201(d)(2) provides that for an airplane demonstrating an unmistakable inherent aerodynamic warning in a particular configuration of a magnitude and severity that is a strong and effective deterrent to further speed reduction, the airplane may be considered stalled when it reaches the speed at which the effective deterrent is clearly manifested. (This exception is present in the current rule but is only applicable to those airplanes demonstrating the required degree of warning in all required configurations). The FAA believes that it is necessary that an applicant be allowed to limit the stall demonstration to the speed where a strong and effective deterrent (such as severe buffeting) is clearly manifested because operation of the airplane at any lower airspeed may be hazardous. Therefore, the FAA believes that any increase in an operating airspeed because a stall demonstration was limited to the airspeed at which there exists an effective deterrent, as provided in proposed §25.201(d)(2), is justified.

Accordingly, the proposal to amend § 25.201 is adopted as proposed, except that a nonsubstantive change is made to proposed § 25.201(d)(2) to clarify its intent. The proposal to amend § 25.207 is adopted without substantive change.

*Proposal 6–45.* For comments related to the proposal to amend § 25.207, see Proposal 6–44.

*Proposal 6–46.* Proposed § 25.233(a) would change the requirements concerning ground looping tendency in cross winds by substituting "25 knots" in place of "0.2$V_{S_0}$" for the prescribed wind velocity. Several commentators objected to the use of 25 knots for the required wind velocity, stating that the present requirement corresponds to about 20 knots for most airplanes, and that standardizing on a height of 10 meters above the surface for airport wind velocities (see Proposal 6–32 for § 25.21(f)) would also increase the required cross wind component (as compared with the present practice of correcting wind velocity to a height of 50 feet). The FAA agrees that 20 knots would be an appropriate minimum value for the cross wind component; however, this would be less severe than the present rule for airplanes with a stalling speed ($V_{S_0}$) greater than 100 knots. Therefore, § 25.233(a) is revised to replace "0.2$V_S$" with "20 knots or 0.2 $V_{S_0}$, whichever is greater, except that the wind velocity need not exceed 25 knots.".

One commentator suggested that the rule be written to allow the use of analysis to show acceptable ground handling characteristics for cross wind components greater than 20 knots. The FAA does not agree that analytic methods are reliable for this purpose. (See discussion of Proposal 6–47).

*Proposal 6–47.* Proposed § 25.237(a)(1) would establish 25 knots as the minimum cross wind component for landplanes, to be demonstrated on dry runways. Several commentators objected to the use of 25 knots for the required minimum wind velocity. For reasons explained in the discussion of Proposal 6–46, proposed §§ 25.237 (a) and (b) are revised, consistent with § 25.233 as adopted, by replacing "25 knots" with "20 knots or 0.2 $V_{S_0}$, whichever is greater, except that it need not exceed 25 knots."

Proposed § 25.237(a)(2) would require that a safe cross wind component be established for wet runways, but would allow this to be determined by analysis in lieu of demonstration. Two commentators recommended that the proposal concerning wet runways be deleted, since there is no definition of "wet," and they considered the current rules for cross wind operation to be adequate for either wet or dry cases. Two other commentators doubted the validity of analytic methods for establishing a safe cross wind component for wet runways. In light of the comments received, and after further review, the FAA believes that proposed § 25.237(a)(2) is premature and it is withdrawn.

*Proposal 6–48.* Two commentators recommended that proposed § 25.251(e) be revised to prescribe an acceleration of ±0.1 g, instead of ±0.05 g, in defining the onset of buffet. One of the commentators stated that this change would ensure a level of buffet that would be distinguishable under turbulent air conditions. The commentator stated that contrary to the explanation in the notice, test pilots have signified the onset of buffet when the buffet level at a flight station was greater than ±0.1 g, and that defining buffet onset in § 25.251(e) as ±0.05 g would unnecessarily limit the altitude-payload capability of the airplane. After considering the comments received, and after further review, the FAA does not believe it has enough information at this time to specify an acceleration value for the onset of perceptible buffeting which would be applicable to all airplanes. Accordingly, the proposal is withdrawn.

*Proposal 6–49.* Proposed new § 25.255 would establish requirements for maneuvering and dive recovery characteristics with the airplane out of trim by the amount resulting from a three-second movement of the primary longitudinal trim system at its normal rate with no aerodynamic load, or the maximum mistrim that can be sustained by the autopilot while maintaining level flight in the high speed cruising condition, whichever is greater. One commentator said that the requirement would appear not to apply to a manual trim system, and that this should be made clear. The intent of the proposal is to provide a basic maneuvering stability and dive recovery requirement regardless of the type of trim system used in the airplane.

To make this intent clear, the first sentence of the lead-in of proposed § 25.255 is revised by inserting the parenthetic "(or an equivalent degree of trim for airplanes that do not have a power operated trim system)". In addition, current § 25.655(b) requires that if an adjustable stabilizer is used, it must have stops that will limit the range of travel to the maximum for which the airplane is shown to meet the trim requirements of § 25.161. Therefore, the first sentence of the lead-in of proposed § 25.255 is also revised by inserting an exception indicating that the trim movement need not exceed the range established by stops in the trim system, including those required by § 25.655(b) for adjustable stabilizers. It should be noted that the word "primary" in the first sentence of the lead-in of proposed § 25.255 is being deleted since its usage in this context is inappropriate. The same commentator also said that he does not understand the phrase relating to the autopilot, but believes there is a need for an analysis to show whether greater mistrim can result from autopilot or other system malfunction, or from normal autopilot functioning such as when flying on altitude hold through updrafts. The phrase in the proposal relating to autopilots is intended to provide for circumstances in which the trim system is actuated, either by a runaway or by the pilot, while the autopilot is engaged, and the autopilot is then disengaged when the degree of mistrim reaches the point where the autopilot can no longer hold level flight. The FAA believes that this is an appropriate test criterion. In addition, it should be noted that autopilot malfunctions are covered under § 25.1329.

One commentator recommended that the proposed wording "at its normal rate with no aerodynamic load" in the lead-in of proposed § 25.255 be replaced by "at the rate existing for the specified flight condition." The FAA agrees that where the trim system is designed to vary the rate of trim movement according to the flight condition (e.g., as a function of the dynamic pressure), this variation may be taken into account; however, the effects of aerodynamic loads on trim movement may vary in a complex manner, e.g., with center of gravity, airspeed, and system friction. As stated in the notice, the proposal is intended to simulate a typical out-of-trim condition. The FAA believes that the requirement should be specified so that the required trim change can be determined by a relatively simple and uniform procedure. Accordingly, § 25.255 as adopted is revised to specify a three-second movement of the trim system at the normal rate for the particular flight condition with no aerodynamic load.

One commentator recommended that § 25.255(a) be changed to read: "The slope of the stick force vs. g (curve) for load factors between −1g and +2.5g

must be positive at speeds up to $V_{FC}/M_{FC}$ or aural warning (speed) except that a 'flattening' of the stick force gradient or a reduction in stick force is permissible if it does not result in the tendency to overcontrol. Lesser acceleration values may be used at altitudes where buffet envelopes are established in accordance with § 25.251(e)." The FAA disagrees with the recommendation. Current § 25.253(b) already allows $M_{FC}$ to be the same as the Mach number at which effective speed warning occurs for altitudes where Mach number is the limiting factor. At lower altitudes where airspeed is the limiting factor, $V_{FC}$ under § 25.253(b) must be higher than the aural warning speed under § 25.1303 (c)(1). Recoveries from severe upsets or evasive maneuvers are likely to be made in this altitude range at speeds above the aural warning speed. Therefore, the FAA believes that the proposed requirement should be met at speeds up to $V_{FC}/M_{FC}$. In addition, to minimize the possibility of over-control and overstressing the airplane structure, the FAA believes that a reduction in stick force (negative slope of the stick force per g curve) should not be allowed at speeds up to $V_{FC}/M_{FC}$. However, it should be noted that flattening of the stick force gradient would be allowed under the proposal as long as the slope is positive.

The changes to proposed § 25.255(a) recommended by this commentator include deleting the proposed requirement for the speed range between $V_{FC}/M_{FC}$ and $V_{DF}/M_{DF}$ (the demonstrated flight dive speed). For this speed range, the proposal states that there may not be reversal of the primary longitudinal control force. Speeds above $V_{FC}/M_{FC}$ have been reached during recovery from upsets in severe turbulence. The FAA believes that reversal of the direction of the control force (as shown on the stick force per g diagram) should not be allowed at speeds up to $V_{DF}/M_{DF}$, because force reversal on the primary control could be confusing to the pilots and contribute to hazardous over-control in severe turbulence.

Proposed § 25.255(a) provides that acceleration values less than those prescribed may be used at altitudes and speeds where buffet envelopes are established in accordance with § 25.251(e). One commentator objected to this provision and suggested that the proposal be revised to state that, at speeds up to $V_{FC}/M_{FC}$, the stick force curve must have a positive slope, and at speeds up to $V_{DF}/M_{DF}$ there may not be a reversal of the primary longitudinal control force for normal acceleration values between $-1$ g and the lesser of 2.5 g and a normal acceleration corresponding, in the particular circumstances of weight, altitude, and air speed or Mach number, to buffeting or other phenomena, of such intensity as to be a strong deterrent to further application of primary longitudinal control force. The FAA does not believe that the buffeting criteria suggested by the commentator would be appropriate, since severe buffeting could mask the normal stick force gradient characteristics.

Another commentator suggested that the proposal be revised to state that "where buffet envelopes are established in accordance with § 25.251(e), the corresponding lesser acceleration values may be used." The FAA disagrees with the recommendation. The suggested wording would indicate that the requirement for positive maneuvering stability (stick force per g) is limited to the load factors within the buffet onset envelopes (i.e., perceptible buffeting) determined under § 25.251(e). However, § 25.251(e) also requires that probable inadvertent excursions beyond the boundaries of the buffet onset envelopes may not result in unsafe conditions. The FAA believes that positive maneuvering stability should be required for inadvertent excursions beyond the buffet onset boundaries, since a pilot is likely to exceed these boundaries in recovering from an upset.

Accordingly, § 25.255 is clarified by deleting the specific acceleration (g) values and exception clause in paragraph (a), and by setting forth a revised exception clause in a paragraph (e) which states that the accelerations need not exceed the maneuvering load factors associated with probable inadvertent excursions beyond the boundaries of the buffet onset envelopes determined under § 25.251(e). For consistency with the structural strength requirements, § 25.255(e) as adopted also states that the accelerations need not exceed the limit maneuvering load factors prescribed in §§ 25.333(b) and 25.337.

In addition, the other paragraphs of proposed § 25.255 have been restructured and redesignated for clarity. The second sentence of proposed § 25.255(d) would provide for the use of longitudinal trim to assist in producing the required 1.5 g for recovery. One commentator suggested that a clause be inserted to require that it be possible to produce at least 1.2 g without use of the longitudinal trim system and without exceeding a longitudinal control force of 125 lbs. The FAA believes that the recommended change is unnecessary because proposed § 25.255(d) already provides that longitudinal trim can only be used to assit in producing 1.5 g if it meets certain requirements.

Proposed § 25.255(d) requires that if the longitudinal trim is used to assist in the dive recovery, it must be shown that the trim can be actuated in the nose up direction with the primary surface (e.g., elevators) loaded to produce the least of the nose up control forces specified in paragraphs (d)(1), (d)(2), and (d)(3). One commentator recommended that proposed paragraph (d)(1) be deleted and that paragraph (d)(2) be changed to "125 pounds." The FAA does not agree. In an upset, the initial attempt at recovery is likely to be made with the primary pitch control, and on some airplane designs the airloads on the horizontal tail surfaces tend to prevent movement of the trim system at high speeds. The change recommended by the commentator assumes, in effect, that the pilots will actuate the trim in time to obtain recovery before they apply more than 125 pounds on the primary control. This may not be a valid assumption in extreme upset conditions.

One commentator stated that it is impracticable to demonstrate 1.5g, and less than 1 g, at $V_{DF}/M_{DF}$ in a flight test without exceeding $V_{DF}/M_{DF}$, and that some alleviation should be provided to cover this. Proposed § 25.255(d), which states that it must be possible from an overspeed condition at $V_{DF}/M_{DF}$ to produce at least 1.5 g for recovery by applying not more than 125 pounds of control force, would only require that the test be started at $V_{DF}/M_{DF}$. With regard to accelerations less than 1 g, the commentator has apparently misinterpreted the requirement of proposed § 25.255(f). The intent of the requirement in proposed § 25.255(f) is that the entry speeds for flight test investigations at acceleration values less than 1 g should be limited to the extent necessary to accomplish a recovery without exceeding $V_{DF}/M_{DF}$. To clarify this intent, proposed § 25.255(f) is revised and incorporated into § 25.255 (e).

Another commentator recommended certain changes in the arrangement of paragraphs in § 25.255 along with other changes already discussed above. The FAA believes, however, that the paragraphs of proposed § 25.255, as revised, are in the most appropriate order for clarity.

One commentator stated that proposed § 25.255 should be changed to be consistent with the manner in which the out-of-trim special condition has been applied in certification tests since 1965. The wording of the special conditions for various airplanes, and of related regulations §§ 25.251 and 25.253, has changed between 1965 and the present time. The proposal in the notice is based on the wording of recent special conditions.

*Proposal 6–50.* Proposed § 25.703 would require a takeoff warning system to warn the pilots during the initial portion of the takeoff roll if the airplane is in a configuration that would prevent successful completion of the takeoff. One commentator recommended that the proposed requirement for both aural and visual warnings be changed to require either an aural or visual warning. Another commentator questioned the desirability of a visual warning, particularly at night, citing the time that may be lost in searching for a visual warning. The FAA agrees with the latter comment. Accordingly, the requirement for an aural warning is retained and the requirement for a visual warning is withdrawn.

One commentator recommended that the words "including any of the following" (configurations) in proposed § 25.703(a) be changed to "consisting of the following" (configurations). The FAA does not agree since a particular airplane design may incorporate some other variable geometry device that would not allow a safe takeoff when in the wrong position.

The same commentator stated that proposed § 25.703(c), which would re-

quire that the means used to activate the system function properly throughout the ranges of takeoff weights, altitudes, and temperatures for which certification is requested, is superfluous and should be deleted. The FAA believes that this paragraph should be retained to clearly define the scope of the requirements.

This commentator also recommended deletion of proposed § 25.703(d) which would require that the system be designed to provide reliable sensing of an unsafe position of each critical aerodynamic surface. The commentator stated that such a system would be unworkable, over-sophisticated, and could degrade flight safety through numerous nuisance warnings. He pointed out that critical aerodynamic surfaces would include ailerons, rudder, and spoilers, and that "proper" position of such surfaces during takeoff would be affected by cross winds, engine failure, etc. The FAA agrees that the requirements in proposed § 25.703(d) could result in a warning system so complex that its effectiveness may be impaired. Proposed paragraph (d) is therefore withdrawn.

In regard to proposed § 25.703(b), one commentator recommended that consideration be given to a system cutoff at some significant airspeed, e.g., 100 knots. It was stated that any valid warning would probably have sounded by the time that speed is reached and the cutoff would preclude unwarranted aborts due to warning system malfunction at high speeds. Proposed § 25.703(b) would require the warning to continue until the configuration is changed to allow a safe takeoff, the takeoff roll is terminated, or the warning is manually deactivated by the pilot. The FAA agrees that a system cutoff at high speeds should be permitted, but believes that the cutoff should not be set below the $V_1$ speed, since the takeoff can be rejected within the established accelerate-stop distance from any speed up to $V_1$. Since the next speed above $V_1$ that can be sensed by a simple means is $V_R$ (e.g., by nose gear switches), the FAA believes that deactivation of the takeoff warning system should be allowed when the airplane is rotated for takeoff. Proposed § 25.703 is revised accordingly.

With respect to the requirement in proposed § 25.703(b) that the warning must continue until the takeoff roll is terminated, the intention of the proposal was not to require that the warning must continue until the airplane is brought to a full stop, but that it must continue until action is taken by the pilot to terminate the takeoff roll, for example by closing all throttles. Proposed § 25.703 (b) is revised accordingly.

Another commentator objected to the proposal, stating that the warning system would eliminate reliance on the checklist and induce more hazards than it is designed to eliminate. The FAA does not agree that the warning system would eliminate reliance on the checklist; instead it would serve as a back-up for the checklist, particularly in unusual situations, e.g., where the checklist is interrupted or the takeoff is delayed. The commentator stated that the additional aural warning system would add to the problem of cockpit confusion caused by the multitude of aural warning requirements. The FAA does not agree since the takeoff warning would occur during the initial portion of the takeoff roll and therefore should not be confused with flight over-speed warning, stall warning, or landing gear warning during approach. The commentator added that it is doubtful if a reliable, practical, safe system can be designed, much less for a cost that would approximate the possible benefits. The FAA does not agree since such systems have been developed and used on relatively complex airplanes. The warning systems can be simpler on airplanes having fewer or less critical variable geometry devices.

One commentator recommended that consideration be given to including unreleased brakes in the takeoff warning system in view of the serious consequences of failing to release brakes fully before takeoff. The FAA does not now have sufficient information to justify adopting the suggestion made by this commentator.

The proposed new § 25.703 is adopted with the revisions discussed above and a nonsubstantive revision for clarity.

*Proposal 6–51.* One commentator suggested the use of the word "suspended" rather than "silenced" in proposed § 25.729(e)(3). The FAA agrees with this suggestion, since it would result in consistency of wording between this section and proposed § 23.729(f)(1). Section 25.729(e)(3) is revised accordingly.

*Proposal 6–52.* For comments related to the proposal to revise § 25.1043(b), see Proposal 6–23.

*Proposal 6–53.* No unfavorable comments were received on the proposal to revise § 25.1501. Accordingly, the proposal is adopted without substantive change.

*Proposal 6–54.* For comments related to the proposal to revise § 25.1521(e), see Proposal 6–23.

*Proposals 6–55 and 2–96.* One commentator recommended that proposed § 25.1581(a)(2), which would require that the Airplane Flight Manual contain "Other information necessary for safety," be deleted. He stated that the proposed requirement would be far too broad, and could include all information now provided in the crew operating manual. The FAA agrees that the proposed wording may be too broad, but does not agree that all requirements for additional information should be eliminated. Section 25.1581(a)(2) as adopted requires other information that is necessary for safe operation because of design, operating, or handling characteristics. This wording is the same as current § 25.1581(c), except that the word "unusual" is deleted for the reasons stated in notice.

The same commentator also recommended deletion of proposed § 25.1581 (b), which would require that each part of the manual containing required information be approved, segregated, identified, and clearly distinguished from each unapproved part of the manual. The commentator stated that he is not aware of any unapproved sections of the Airplane Flight Manual, and that the proposal implies a crew manual with the FAA limitation data so marked. The FAA does not agree with the recommended deletion of this requirement. The proposed paragraph is the same as current § 25.1581(b), and is intended to cover cases where the applicant desires to include information in the manual that is not required by the FAA.

Proposal 6–55 to amend § 25.1581 is adopted with the revisions discussed above.

The disposition of Proposal 2–96, which proposed to add a new § 25.1581 (d) (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–55. No unfavorable comments were received on Proposal 2–96 and the proposal to add a new § 25.1581(d) is adopted without substantive change.

*Proposal 6–56.* For comments related to the proposal to amend § 25.1583, see Proposal 6–23.

*Proposals 6–57 and 2–87.* No unfavorable comments were received on the proposal to amend § 25.1585. Accordingly, the proposal is adopted without substantive change.

Disposition of Proposal 2–87 to amend § 25.1353 (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–57. Proposals 2–39, 2–131, and 2–186 to amend §§ 23.1353, 27.1353, and 29.1353, respectively (Notice 75–10), are substantively identical to Proposal 2–87 and all of these proposals are discussed below.

Commentators suggested that proposed §§ 25.1353(c)(5) and 29.1353(c)(5) be revised by adding the word "or" between paragraphs (c)(5)(i) and (c)(5)(ii) to allow an alternative design. The commentators misinterpreted the proposal. The sections as adopted provide for three alternatives with an "or" understood between paragraphs (c)(5)(ii) and (c)(5)(iii) and with an "or" understood between paragraphs (c)(5)(i) and (c)(5)(ii).

One commentator suggested that the proposals should be broadened to include nickel cadmium battery installations other than those capable of being used to start an engine or an auxiliary power unit. The proposals apply only to nickel cadmium batteries that are subject to a rapid drain because they are used to start an engine or auxiliary power unit. The FAA does not have enough information to indicate that in other installations the drain on nickel cadmium batteries is sufficiently rapid to require compliance with the proposed provisions.

One commentator objected to proposed §§ 27.1353(f) and 29.1353(c)(5) on the basis that the requirement should be limited to nickel cadmium batteries other than 20-cell batteries and to only certain battery locations. The commentator also stated that the requirement for helicopters should be different from that for airplanes since helicopters are

able to execute an emergency landing much quicker than airplanes. The FAA has insufficient information at the present time to warrant any of the distinctions suggested by the commentator.

The FAA believes that the requirement in proposed § 25.1353(c)(5) concerning operating procedures in the Airplane Flight Manual should be transferred to § 25.1585(a), since that section pertains to operating procedures. The proposal for § 25.1353(c)(5) is revised and § 25.1585(a) amended accordingly. The remainder of proposed § 25.1353(c)(5) is redesignated § 25.1353(c)(6) in view of the adoption of a new § 25.1353(c)(5) in Amendment No. 5. The same revisions are also made to proposed §§ 23.1353(f), 27.1353(f), and 29.1353(c)(5), designated as §§ 23.1353(g), 27.1353(g), and 29.1353(c)(6), respectively, and to §§ 23.1585, 27.1585, and 29.1585.

*Proposals 6–58 and 2–98.* Proposed §§ 25.1587 (c)(5) and (c)(6), which would add requirements for information on the vertical distance for transition to approach climb determined under proposed § 25.121(e) (Proposal 6–38), and on the en route net flight path data determined under proposed § 25.123 (Proposal 6–39), are withdrawn in view of the withdrawal of Proposals 6–38 and 6–39.

Disposition of Proposal 2–98 to revise § 25.1587 (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–58. No unfavorable comments were received on Proposal 2–98 and it is adopted as proposed except that the reference in proposed § 25.1587(b)(4) to § 25.101(c) is changed to reference §§ 25.101 (f), (g), and (h), Current § 25.1587(c)(3), on which proposed § 25.1587(b)(4) is based, was adopted as part of the recodification of Part 4b of the Civil Air Regulations, effective February 1, 1965 (29 FR 18289). Specifically, § 25.1587 replaced § 4b.743 of the CARs and § 4T.743 of Special Civil Air Regulation 422B. Section 4T.743(c), which was replaced by § 25.1587(c)(3), referenced § 4T.111(c) and the requirements of § 4T.111(c) are now contained in §§ 25.101 (f), (g), and (h), not § 25.101(c) as the current rule indicates. The purpose of the recodification program was simply to clarify the regulations. No substantive changes, other than relaxatory ones that were completely noncontroversial, were intended. The FAA believes that the change being made is a nonsubstantive editorial change since § 25.1587(c)(3) has been consistently interpreted in accordance with the rule as originally set forth in § 4T.743(c) of Special Civil Air Regulation 422B.

*Proposal 6–59.* For comments related to the proposal to amend § 27.25(b), see Proposal 6–5. The proposal to amend § 27.25(b) is adopted without substantive change.

*Proposal 6–60.* For comments related to the proposal to amend § 27.29, see Proposal 6–5.

*Proposal 6–61.* Proposed new §§ 27.33(e) and 29.33(e) (Proposal 6–77 would require a main rotor low-speed warning for each single engine helicopter and each multiengine helicopter that does not have an approved device that automatically increases power on the operating engines when one engine fails. Several commentators stated that operating experience does not indicate the need for a main rotor low-speed warning and that the instruments furnished the pilot are adequate to monitor rotor r.p.m. safely. One of these commentators also stated that if the warning is set high enough to be effective, the pilot will rely on it in lieu of monitoring rotor r.p.m. as he should and that the warning will activate during low r.p.m. transients which are entirely safe and this may cause pilot action that is unsafe. The commentator stated that since the National Transportation Safety Board (NTSB) has recommended an engine failure warning device on all turbine engines, this proposal should be withdrawn or deferred until action has been taken on the NTSB recommendations. The FAA does not agree. In regard to the comments concerning monitoring of instruments and rotor r.p.m. by the pilot, it should be noted that one of the main reasons for providing rotor low-speed warning is to assist the pilot in maintaining safe rotor speed after an engine failure when his attention is directed to flight path control and emergency procedures. With respect to activation of the warning during low-rotor r.p.m. transients, the FAA believes that the warning can be set to avoid nuisance warnings in normal maneuvers and still meet the requirements of this section. The NTSB Release for Safety Recommendations A–75–72 and 73, issued September 2, 1975, recommended that Parts 27 and 29 be amended to require that all turbine engine-powered helicopters be equipped with a prominent engine-out visual warning system and an aural warning system which can be heard with or without the use of a headset. The FAA believes, as stated in its response to the NTSB, that the proposed requirement for rotor low-speed warning is more desirable than an engine-out warning since a rotor low-speed warning would warn the pilot of an unsafe low rotor speed due to any cause, including engine failure, and will continue the warning function during power-off descent and landing.

One commentator noted that the FAA has imposed special conditions requiring engine-out warnings on certain turbine engine-powered helicopters, and stated that engine-out warnings should not be required in addition to rotor low-speed warning. The FAA does not believe it will be necessary to issue a special condition requiring installation of an engine-out warning on those helicopters with a rotor low-speed warning.

One commentator objected to the deletion of §§ 27.33(b)(3) and 29.33(b)(3). Current §§ 27.33 (b)(1), (b)(2), and (b)(3) (and §§ 29.33 (b)(1), (b)(2), (b)(3)) provide, for all rotorcraft, three alternative methods for showing that main rotor speeds substantially less than the minimum approved main rotor speed will not occur under any sustained flight condition with power on. One of the alternatives, paragraph (b)(3), is to provide adequate means to warn the pilot of unsafe main rotor speeds, but the proposal would delete this paragraph, thus requiring all rotorcraft to comply with paragraph (b)(1) or (b)(2). This was not the intent of the proposal. Accordingly, §§ 27.33(b)(3) and 29.33(b)(3) are retained. In addition, for clarification, the lead-in of §§ 27.33(b) and 29.33(b) are revised so that they are only applicable to rotorcraft that are not required to have a main rotor low-speed warning under § 27.33(e) or § 29.33(e), respectively.

*Proposal 6–62.* Two commentators objected to the proposals for §§ 27.45 and 29.45, stating that the basis for humidity levels has not been determined and varies between engines. These commentators further stated that there is no industry agreement on the effect of humidity on power or that humidity has a significant effect on power. The effects of humidity on the power of reciprocating engines are well understood and are generally the same between engine types. The effects of humidity on the power or thrust of turbine engines may differ between engine types. The proposal, however, establishes a reference humidity structure for the development of rotorcraft performance data. It does not prejudge the nature of the corrections, if any, which may be required. Each turbine engine must be evaluated to determine the effect of humidity on thrust or power, and, where rotorcraft performance is affected, it must be based on the humidity reference condition.

One commentator objected to the proposals on the basis that the humidity reference for turbine engine-powered rotorcraft may not be representative of average humidity conditions encountered in service. No safety problem has been identified with the use of the proposed humidity reference in the type certification of transport category airplanes, and the reference is considered equally valid for the type certification of rotorcraft.

One commentator questioned why a reciprocating engine-powered rotorcraft would be required to use a humidity correction different from that for turbine engine-powered rotorcraft. The humidity correction proposed for reciprocating engine-powered rotorcraft is similar to the current requirements for reciprocating engine-powered transport category airplanes and the proposed humidity correction for turbine engine-powered rotorcraft is similar to the current requirements for turbine engine-powered transport category airplanes, and the requirements for transport category airplanes have been administered without difficulty. In addition, the humidity correction requirements for turbine engine-powered rotorcraft are based on the fact that the power or thrust of turbine engines diminishes significantly as the ambient atmospheric temperature is increased. Power or thrust variations related to humidity could therefore have

an adverse effect upon safety at temperatures above standard.

The proposal to revise § 27.45 and the proposal to amend § 29.45 are adopted without substantive change.

*Proposals 6–63 and 2–100.* Under proposed § 27.65(b)(2), if the never-exceed speed $V_{NE}$ is less than the best rate-of-climb speed $V_Y$ at any altitude within the range for which certification is requested, the steady rate of climb must be determined over the entire range of weights, temperatures, and altitudes for which certification is requested. One commentator recommended that the rate of climb information be required only for the range of altitudes where $V_{NE}$ is less than $V_Y$, instead of the entire range of altitudes. The FAA disagrees. The climb performance and speed of a helicopter may change significantly below, as well as above, the altitude at which $V_{NE}$ is less than $V_Y$. However, after further review, the FAA believes that it is only necessary that climb data be determined over the range of altitudes from 2,000 feet below the altitude at which $V_{NE}$ is equal to $V_Y$ up to the maximum altitude for which certification is requested. The proposal to amend § 27.65 is revised accordingly.

In addition, proposed § 27.65(b)(2)(i) is revised to allow the rate-of-climb to be determined at the climb speed selected by the applicant (instead of the most favorable climb speed) at or below $V_{NE}$. The FAA believes that the proposed paragraph (b)(2)(i) would impose an unnecessary burden on the applicant and result in complex operating information, since the most favorable climb speed may be a function of several variables.

Disposition of Proposal 2–100 to amend § 27.65(a)(2) (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–63. No unfavorable comments were received on the proposal to amend § 27.65(a)(2). Accordingly, the proposal is adopted without substantive change.

*Proposal 6–64.* Proposed § 27.67(c) would require the determination of the one-engine-inoperative steady rate of climb with maximum continuous power on the operating engines, and (for helicopters for which certification for the use of 30-minute power is requested) at 30-minute power. One commentator said that there is no need to show the climb performance data for both the maximum continuous and 30-minute power levels and, therefore, the word "and" preceding the parenthetical expression should be changed to "or". The FAA does not agree. Even though an applicant may request certification for the use of 30-minute power, climb performance data for maximum continuous power should be furnished to the pilot for use in operations that may require more than 30 minutes to reach a safe landing area after failure of one engine, e.g., over-water operations. Accordingly, § 27.67(c) is adopted without substantive change.

*Proposal 6–65.* No unfavorable comments were received on the proposal to revise § 27.75(a)(2)(ii). Accordingly, the proposal is adopted without substantive change.

*Proposal 6–66.* No unfavorable comments were received on the proposal to amend § 27.143. Accordingly, the proposal is adopted without substantive change.

*Proposal 6–67.* No unfavorable comments were received on the proposal to revise § 27.175(c). Accordingly, the proposal is adopted without substantive change.

*Proposal 6–68.* For comments related to the proposal to revise § 27.1043(b), see Proposal 6–23.

In addition, a nonsubstantive editorial change is being made to the lead-in of § 27.1043(a) to reference § 27.1041(b) instead of § 27.104(b).

*Proposal 6–69.* No unfavorable comments were received on the proposal to revise § 27.1501. Accordingly, the proposal is adopted without substantive change.

*Proposals 6–70 and 2–135.* Disposition of Proposal 2–135 to amend § 27.1545 (Notice 75–10) was deferred so it could be considered in connection with Proposal 6–70 to amend § 27.1505. No unfavorable comment was received on Proposal 2–135. Accordingly, the proposal is adopted without substantive change.

Proposed §§ 27.1505(c) and 29.1505(c) (Proposals 6–70 and 6–84, respectively) would allow the establishment of a never exceed speed, $V_{NE}$ (power-off), that is less than $V_{NE}$ with power on, if $V_{NE}$ (power-off) is not less than a speed midway between the power-on $V_{NE}$ and the speed for maximum range in autorotation at maximum weight. One commentator recommended that "$V_Y$ or the climb speed selected by the applicant in demonstrating compliance with the climb requirements" be inserted in proposed § 27.1505(c) in place of the speed for maximum range in autorotation. The commentator stated that since determination of the speed for maximum range in autorotation is not presently required, the substitution of the climb speed (which is determined under the climb requirements in §§ 27.65 or 27.67) would accomplish the intent of placing a lower limit on $V_{NE}$ (power-off) without unnecessary additional demonstration requirements.

After further consideration, the FAA believes that the speed used in determining climb performance (one-engine-inoperative climb performance, if applicable) should be used in establishing a $V_{NE}$ (power-off) for both Part 27 and 29 helicopters, instead of the speed for maximum range in autorotation at maximum weight. The speed midway between power-on $V_{NE}$ and the appropriate climb speed is expected to be high enough to provide the pilot with an adequate range of speeds and glide angles during autorotation. In addition, the determination of $V_{NE}$ (power-off) will be based on information already required to be furnished by the applicant which would not be the case if the speed for maximum range in autorotation were prescribed since it is only required to be determined for certain Part 29 Category B helicopters. The proposals to amend §§ 27.1505 and 29.1505 are revised accordingly.

*Proposal 6–71.* For comments related to the proposal to add a new § 27.1521(f), see Proposal 6–23.

*Proposal 6–72.* No unfavorable comments were received on the proposal to add a new § 27.1527. Accordingly, the proposal is adopted without substantive change.

[For discussion concerning the amendment of § 27.1545, see Proposals 6–70 and 2–135.]

*Proposals 6–73, 2–139 and 2–140.* No unfavorable comments were received on Proposal 6–73 to amend § 27.1581. The proposal is adopted without substantive change, except that proposed § 27.1581(a)(2) is revised in accordance with the discussion of the proposal to amend § 25.1581 (Proposal 6–55).

Disposition of Proposals 2–139 to amend § 27.1581 and 2–140 to amend § 27.1587 was deferred so that these proposals could be considered in connection with Proposal 6–73. No unfavorable comments were received on Proposal 2–139 or Proposal 2–140. Proposal 2–139 to amend § 27.1581 is adopted without substantive change. For reasons that are stated in the discussion of Proposal 6–23 for § 23.1521(e), Proposal 2–140 to amend § 27.1587 is revised by adding a new § 27.1587(a)(2)(iii) requiring information on the maximum ambient atmospheric temperature at which compliance with the cooling requirements was shown. Additionally, the parenthetical phrase "(if provided)" is deleted from § 27.1587(b) since the amendment to § 27.1581 requires that a Rotorcraft Flight Manual be furnished for each rotorcraft. The proposal to amend § 27.1587 is adopted with the changes discussed above.

*Proposal 6–74.* For comments related to the proposal to amend § 27.1583, see Proposal 6–23.

*Proposals 6–75 and 2–131.* Proposed §§ 27.1585(c) and 29.1585(c) would require the operating procedures section of the Rotorcraft Flight Manual to contain information on the procedures for reducing airspeed to $V_{NE}$ (power-off) for helicopters for which a $V_{NE}$ (power-off) is established under §§ 27.1505(c) and 29.1501(c), respectively. One commentator stated that he did not favor systematically placing explicit engine, altitude, and $V_{NE}$ (power-off) limitations in the "limitations" chapter of the Flight Manual. The commentator apparently misinterpreted the proposal, as it would affect only the operating procedures section, not the limitations section. The commentator also stated that these explanations should only be required when they bring significant information to the pilot and when the limitation results from an indirect and not an obvious cause. The FAA believes that in view of the surprise element that may be associated with engine failure in service operations, the procedure for reducing airspeed to not more than $V_{NE}$ (power-off) should be furnished for each helicopter for which a $V_{NE}$ (power-off) is established. Accordingly, the proposals for §§ 27.1585(c) and 29.1585(c) are adopted without substantive change.

Disposition of Proposal 2–131 to amend § 27.1353 (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–73. For comments related to proposed § 27.1353(f) and for an explanation of the revision to proposed § 27.1353(f), see the discussion of Proposal 2–87 under Proposal 6–57.

*Proposal 6–76.* For comments related to the proposal to amend § 29.29, see Proposal 6–5.

*Proposal 6–77.* For comments related to the proposed amendment of § 29.33, see Proposal 6–61 for § 27.33.

*Proposal 6–78.* For comments related to proposed § 29.45, see Proposal 6–62.

*Proposal 6–79.* One commentator recommended that proposed § 29.65(c) be revised to require climb data only for those altitudes where $V_{NE}$ is less than $V_Y$ at sea level. For a discussion of this comment and the explanation for the revisions to proposed § 29.65(c), see Proposal 6–63. This commentator also stated that proposed § 29.65(c) is superfluous for Category B rotorcraft since its duplicates the requirement of proposed § 29.65(a)(4). The FAA agrees that some clarification is needed and proposed § 29.65 (a) and (c) are revised to list all of the Category B requirements in paragraph (a) and to make paragraph (c) applicable only to Category A helicopters. For an explanation of the revisions to proposed § 29.65(c)(1), see the discussion of the revision to proposed § 27.65(b)(2)(i) under Proposal 6–63. Accordingly, the proposal is adopted with the revisions discussed above and under Proposal 6–63.

*Proposal 6–80.* No unfavorable comments were received on the proposal to amend § 29.143. Accordingly, the proposal is adopted without substantive change.

*Proposal 6–81.* No unfavorable comments were received on the proposal to revise § 29.175(c). Accordingly, the proposal is adopted without substantive change.

*Proposal 6–82.* For comments related to the proposal to revise § 29.1043(b), see Proposal 6–23.

*Proposal 6–83.* No unfavorable comments were received on the proposal to revise § 29.1501. Accordingly, the proposal is adopted without substantive change.

*Proposals 6–84 and 2–188.* For comments related to Proposal 6–84 to amend § 29.1505, and for an explanation of the revisions to proposed § 29.1505(c), see Proposal 6–70.

Disposition of Proposal 2–188 to amend § 29.1545 (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–84 to amend § 29.1505. No unfavorable comments were received on Proposal 2–188. Accordingly, the proposal is adopted without substantive change.

*Proposal 6–85.* For comments related to the proposal to revise § 29.1521(e), see Proposal 6–23.

*Proposal 6–86.* No unfavorable comments were received on the proposal to add a new § 29.1527. Accordingly, the proposal is adopted without substantive change.

[For discussion concerning the amendment of § 29.1545, see Proposals 6–84 and 2–188.]

*Proposals 6–87 and 2–192.* Proposal 6–87 proposed to revise § 29.1581(a) and (b) and to delete § 29.1581(c) and mark it "[Reserved]." Disposition of Proposal 2–192 to add a new § 29.1581(d) (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–87.

No unfavorable comment was received on Proposals 6–87 or 2–192. These proposals to amend § 29.1581 are adopted without substantive change except that proposed § 29.1581(a)(2) is revised in accordance with the discussion of the proposal to amend § 25.1581 (Proposal 6–55).

*Proposal 6–88.* For comments related to the proposal to amend § 29.1583, see Proposal 6–23.

*Proposals 6–89 and 2–186.* For comments related to Proposal 6–89 to add a new § 29.1585(c), see Proposal 6–75.

Disposition of Proposal 2–186 to amend § 29.1353 (Notice 75–10) was deferred so that it could be considered in connection with Proposal 6–89. For comments related to proposed § 29.1353(c), see the discussion of Proposal 2–87 under Proposal 6–57.

*Proposal 6–90.* No unfavorable comments were received on the proposal to amend § 91.31. Accordingly, the proposal to amend § 91.31 is adopted without substantive change.

*Proposal 6–91.* The proposal to amend § 91.37 was made to implement Proposals 2–49, 2–51, 2–52, and 2–93 to amend §§ 25.105, 25.125, 25.241 and 25.1533, respectively, contained in Airworthiness Review Notice No. 2 (Notice 75–10). Since the proposed amendments to Part 25 have been withdrawn (41 FR 55454), Proposal 6–91 is also withdrawn.

*Proposal 6–92.* Proposed § 121.141(b) would authorize an air carrier to revise the operating procedures and the format of the performance data for the applicable Airplane or Rotorcraft Flight Manual and include the revised information in the operator's manual required by § 121.133, if the revised procedures and performance data presentation are approved by the Administrator and are clearly identified as flight manual requirements. One commentator said that there was no need for the identification of the flight manual material. This requirement is in the current rule and the FAA does not have sufficient information at the present time to justify deleting it, especially with regard to the operating limitations.

The commentator also suggested that the second sentence of proposed § 121.141 (b) would be clarified by inserting a clause indicating that if the certificate holder elects to carry the manual required by § 121.133, he must retain all of the limitations section (of the flight manual) as written, unless deviations are specifically authorized by the Administrator. The FAA does not believe that the suggested change is necessary or appropriate. Proposed § 121.141(b) would not authorize a change in the substance or presentation of the operating limitations required for the applicable flight manual. Accordingly, the proposal to revise § 121.141(b) is adopted without substantive change.

## DRAFTING INFORMATION

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## ADOPTION OF THE AMENDMENT

Accordingly, Parts 1, 21, 23, 25, 27, 29, 91, and 121 of the Federal Aviation Regulations are amended as follows, effective March 1, 1978:

## PART 1—DEFINITIONS AND ABBREVIATIONS

**§ 1.1 [Amended]**

1. By amending § 1.1 by deleting the term "Accelerate-stop distance" and its definition.

**§ 1.2 [Amended]**

2. By amending § 1.2 by revising the definition of $V_1$ to read as follows:

* * * * *

$V_1$ means takeoff decision speed (formerly denoted as critical engine failure speed).

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## PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS

3. By adding a new § 21.5 following § 21.3 to read as follows:

**§ 21.5 Airplane or Rotorcraft Flight Manual.**

(a) With each airplane or rotorcraft that was not type certificated with an Airplane or Rotorcraft Flight Manual and that has had no flight time prior to March 1, 1979, the holder of a Type Certificate (including a Supplemental Type Certificate) or the licensee of a Type Certificate shall make available to the owner at the time of delivery of the aircraft a current approved Airplane or Rotorcraft Flight Manual.

(b) The Airplane or Rotorcraft Flight Manual required by paragraph (a) of this section must contain the following information:

(1) The operating limitations and information required to be furnished in an Airplane or Rotorcraft Flight Manual or in manual material, markings, and placards, by the applicable regulations under which the airplane or rotorcraft was type certificated.

(2) The maximum ambient atmospheric temperature for which engine cooling was demonstrated must be stated in the performance information section of the Flight Manual, if the applicable regulations under which the aircraft was type certificated do not require ambient temperature or engine cooling operating limitations in the Flight Manual.

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

§ 23.25 [Amended]

4. By adding at the end of § 23.25(b)(2) the word "and", by deleting § 23.25(b)(3), and by redesignating § 23.25(b)(4) as § 23.25(b)(3).

5. By amending § 23.29 by deleting paragraphs (a)(4) and (a)(5); by adding the word "and" after (a)(2); and by revising paragraph (a)(3) to read as follows:

**§ 23.29 Empty weight and corresponding center of gravity.**

(a) * * *

(3) Full operating fluids, including—

(i) Oil;

(ii) Hydraulic fluid; and

(iii) Other fluids required for normal operation of airplane systems, except potable water, lavatory precharge water, and water intended for injection in the engines.

* * * * *

6. By revising § 23.45 to read as follows:

**§ 23.45 General.**

(a) Unless otherwise prescribed, the performance requirements of this subpart must be met for still air and a standard atmosphere.

(b) The performance must correspond to the propulsive thrust available under the particular ambient atmospheric conditions, the particular flight condition, and the relative humidity specified in paragraphs (d) or (e) of this section, as appropriate.

(c) The available propulsive thrust must correspond to engine power or thrust, not exceeding the approved power or thrust, less—

(1) Installation losses; and

(2) The power or equivalent thrust absorbed by the accessories and services appropriate to the particular ambient atmospheric conditions and the particular flight condition.

(d) For reciprocating engine-powered airplanes, the performance, as affected by engine power, must be based on a relative humidity of 80 percent in a standard atmosphere.

(e) For turbine engine-powered airplanes, the performance, as affected by engine power or thrust, must be based on a relative humidity of—

(1) 80 percent, at and below standard temperature; and

(2) 34 percent, at and above standard temperature plus 50 degrees F.

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

7. By revising §§ 23.49 (a)(1) and (c)(1), and by adding a new § 23.49(e) to read as follows:

**§ 23.49 Stalling speed.**

(a) $V_{S_0}$ is the stalling speed, if obtainable, or the minimum steady speed, in knots (CAS), at which the airplane is controllable, with the—

(1) Applicable power or thrust condition set forth in paragraph (e) of this section;

* * * * *

(c) $V_{S_1}$ is the calibrated stalling speed, if obtainable, or the minimum steady speed, in knots, at which the airplane is controllable with the—

(1) Applicable power or thrust condition set forth in paragraph (e) of this section;

* * * * *

(e) The following power or thrust conditions must be used to meet the requirements of this section:

(1) For reciprocating engine-powered airplanes, engines idling, throttles closed or at not more than the power necessary for zero thrust at a speed not more than 110 percent of the stalling speed.

(2) For turbine engine-powered airplanes, the propulsive thrust may not be greater than zero at the stalling speed, or, if the resultant thrust has no appreciable effect on the stalling speed, with engines idling and throttles closed.

8. By revising § 23.51 to read as follows:

**§ 23.51 Takeoff.**

(a) For each airplane (except a skiplane for which landplane takeoff data has been determined under this paragraph and furnished in the Airplane Flight Manual) the distance required to takeoff and climb over a 50-foot obstacle must be determined with—

(1) The engines operating within approved operating limitations; and

(2) The cowl flaps in the normal takeoff position.

(b) For multiengine airplanes, the lift-off speed, $V_{LOF}$, may not be less than $V_{MC}$ determined in accordance with § 23.149.

(c) Upon reaching a height of 50 feet above the takeoff surface level, the airplane must have reached a speed of not less than the following:

(1) For multiengine airplanes, the higher of—

(i) 1.1 $V_{MC}$; or

(ii) 1.3 $V_{S_1}$, or any lesser speed, not less than Vx plus 4 knots, that is shown to be safe under all conditions, including turbulence and complete engine failure.

(2) For single engine airplanes—

(i) 1.3 $V_{S_1}$; or

(ii) Any lesser speed, not less than Vx plus 4 knots, that is shown to be safe under all conditions, including turbulence and complete engine failure.

(d) The starting point for measuring seaplane and amphibian takeoff distance may be the point at which a speed of not more than three knots is reached.

(e) Takeoffs made to determine the data required by this section may not require exceptional piloting skill or exceptionally favorable conditions.

9. By revising § 23.65 to read as follows:

**§ 23.65 Climb: All engines operating.**

(a) Each airplane must have a steady rate of climb at sea level of at least 300 feet per minute and a steady angle of climb of at least 1:12 for landplanes or 1:15 for seaplanes and amphibians with—

(1) Not more than maximum continuous power on each engine;

(2) The landing gear retracted;

(3) The wing flaps in the takeoff position; and

(4) The cowl flaps or other means for controlling the engine cooling air supply in the position used in the cooling tests required by §§ 23.1041 through 23.1047.

(b) Each airplane with engines for which the takeoff and maximum continuous power ratings are identical and that has fixed-pitch, two-position, or similar propellers, may use a lower propeller pitch setting than that allowed by § 23.33 to obtain rated engine r.p.m. at Vx, if—

(1) The airplane shows marginal performance (such as when it can meet the rate of climb requirements of paragraph (a) of this section but has difficulty in meeting the angle of climb requirements of paragraph (a) of this section or of § 23.77); and

(2) Acceptable engine cooling is shown at the lower speed associated with the best angle of climb.

(c) Each turbine engine-powered airplane must be able to maintain a steady gradient of climb of at least 4 percent at a pressure altitude of 5,000 feet and a temperature of 81 degrees F (standard temperature plus 40 degree F) with the airplane in the configuration prescribed in paragraph (a) of this section.

10. By amending § 23.67 as follows:

1. By inserting the words "reciprocating engine-powered" after the first word "Each" in the lead-in sentence of § 23.67(a).

2. By inserting the words "reciprocating engine-powered" after the first word "For" in the lead-in sentence of § 23.67(b).

3. By adding new §§ 23.67 (c) and (d) to read as follows:

**§ 23.67 Climb: One engine inoperative.**

* * * * *

(c) For turbine-powered multiengine airplanes the following apply:

(1) The steady gradient of climb must be determined at each weight, altitude, and ambient temperature within the operational limits established by the applicant, with the—

(i) Critical engine inoperative, and its propeller in the minimum drag position;

(ii) Remaining engines at not more than maximum continuous power or thrust;

(iii) Landing gear retracted;

(iv) Wing flaps in the most favorable position; and

(v) The means for controlling the engine cooling air supply in the position used in the engine cooling tests required by §§ 23.1041 through 23.1047.

(2) Each airplane must be able to maintain the following climb gradients with the airplane in the configuration prescribed in paragraph (c)(1) of this section:

(i) 1.2 percent (or, if greater, a gradient equivalent to a rate of climb of 0.027 $Vs_0^2$) at a pressure altitude of 5,000 feet and standard temperature (41 degrees F).

(ii) 0.6 percent (or, if greater, a gradient equivalent to a rate of climb of 0.014 $Vs_0^2$) at a pressure altitude of 5,000 feet and 81 degrees F (standard temperature plus 40 degrees F).

(3) The minimum climb gradient specified in paragraphs (c)(2) (i) and (ii) of this section must vary linearly between 41 degrees F and 81 degrees F and must change at the same rate up to the maximum operating temperature approved for the airplane.

(4) In paragraphs (c)(2) (i) and (ii) of this section, rate of climb is expressed in feet per minute and $Vs_0$ is expressed in knots.

(d) For all multiengine airplanes, the speed for best rate of climb with one engine inoperative must be determined.

11. By revising § 23.75 to read as follows:

**§ 23.75 Landing.**

For airplanes (except skiplanes for which landplane landing data have been determined under this section and furnished in the Airplane Flight Manual), the horizontal distance necessary to land and come to a complete stop (or to a speed of approximately 3 knots for water landings of seaplanes and amphibians) from a point 50 feet above the landing surface must be determined as follows:

(a) A steady gliding approach with a calibrated airspeed of at least 1.3 $Vs_1$ must be maintained down to the 50-foot height.

(b) The landing may not require exceptional piloting skill or exceptionally favorable conditions.

(c) The landing must be made without excessive vertical acceleration or tendency to bounce, nose over, ground loop, porpoise, or water loop.

(d) It must be shown that a safe transition to the balked landing conditions of § 23.77 can be made from the conditions that exist at the 50-foot height.

(e) The pressures on the wheel braking system may not exceed those specified by the brake manufacturer.

(f) Means other than wheel brakes may be used if that means—

(1) Is safe and reliable;

(2) Is used so that consistent results can be expected in service; and

(3) Is such that exceptional skill is not required to control the airplane.

12. By revising § 23.77 to read as follows:

**§ 23.77 Balked landing.**

(a) For balked landings, each airplane must be able to maintain a steady angle of climb at sea level of at least 1:30 with—

(1) Takeoff power on each engine;

(2) The landing gear extended; and

(3) The wing flaps in the landing position, except that if the flaps may safely be retracted in two seconds or less without loss of altitude and without sudden changes of angle of attack or exceptional piloting skill, they may be retracted.

(b) Each turbine engine-powered airplane must be able to maintain a steady rate of climb of at least zero at a pressure altitude of 5,000 feet at 81 degrees F (standard temperature plus 40 degrees F), with the airplane in the configuration prescribed in paragraph (a) of this section.

13. By revising § 23.149 to read as follows:

**§ 23.149 Minimum control speed.**

(a) $V_{MC}$ is the calibrated airspeed, at which, when the critical engine is suddenly made inoperative, it is possible to recover control of the airplane with that engine still inoperative, and maintain straight flight either with zero yaw or, at the option of the applicant, with an angle of bank of not more than five degrees. The method used to simulate critical engine failure must represent the most critical mode of powerplant failure with respect to controllability expected in service.

(b) For reciprocating engine-powered airplanes, $V_{MC}$ may not exceed 1.2 $Vs_1$ (where $Vs_1$ is determined at the maximum takeoff weight) with—

(1) Takeoff or maximum available power on the engines;

(2) The most unfavorable center of gravity;

(3) The airplane trimmed for takeoff;

(4) The maximum sea level takeoff weight (or any lesser weight necessary to show $V_{MC}$);

(5) Flaps in the takeoff position;

(6) Landing gear retracted;

(7) Cowl flaps in the normal takeoff position;

(8) The propeller of the inoperative engine—

(i) Windmilling;

(ii) In the most probable position for the specific design of the propeller control; or

(iii) Feathered, if the airplane has an automatic feathering device; and

(9) The airplane airborne and the ground effect negligible.

(c) For turbine engine-powered airplanes, $V_{MC}$ may not exceed 1.2 $Vs_1$ (where $Vs_1$ is determined at the maximum takeoff weight) with—

(1) Maximum available takeoff power or thrust on the engines;

(2) The most unfavorable center of gravity;

(3) The airplane trimmed for takeoff;

(4) The maximum sea level takeoff weight (or any lesser weight necessary to show $V_{MC}$);

(5) The airplane in the most critical takeoff configuration, except with the landing gear retracted; and

(6) The airplane airborne and the ground effect negligible.

(d) At $V_{MC}$, the rudder pedal force required to maintain control may not exceed 150 pounds, and it may not be necessary to reduce power or thrust of the operative engines. 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.

14. By revising § 23.161(c) to read as follows:

**§ 23.161 Trim.**

* * * * *

(c) *Longitudinal trim.* The airplane must maintain longitudinal trim under each of the following conditions:

(1) A climb with maximum continuous power at a speed between Vx and 1.4 $Vs_1$, with—

(i) The landing gear and wing flaps retracted; and

(ii) The landing gear retracted and the wing flaps in the takeoff position.

(2) A power approach with a 3 degree angle of descent, the landing gear extended, and with—

(i) The wing flaps retracted and at a speed of 1.4 $Vs_1$; and

(ii) The applicable airspeed and flap position used in showing compliance with § 23.75.

(3) Level flight at any speed from 0.9 $V_H$ to either Vx or 1.4 $Vs_1$, with the landing gear and wing flaps retracted.

* * * * *

**§ 23.177 [Amended]**

15. By deleting §§ 23.177(a)(4) and (b)(3) and revising the heading of the section to read "Static directional and lateral stability."

16. By revising § 23.181 and its heading to read as follows:

**§ 23.181 Dynamic stability.**

(a) Any short period oscillation not including combined lateral-directional oscillations occurring between the stalling speed and the maximum allowable speed appropriate to the configuration of the airplane must be heavily damped with the primary controls—

(1) Free; and

(2) In a fixed position.

(b) Any combined lateral-directional oscillations ("Dutch roll") occurring between the stalling speed and the maximum allowable speed appropriate to the configuration of the airplane must be damped to 1/10 amplitude in 7 cycles with the primary controls—

(1) Free; and

(2) In a fixed position.

17. By amending § 23.729(f)(1) by revising the last sentence to read as follows:

**§ 23.729 Retracting mechanism.**

(1) * * * If there is a manual shut-off for the warning device prescribed in this paragraph, the warning system must be designed so that, when the warning has been suspended after one or more

throttles are closed, subsequent retardation of any throttle to or beyond the position for normal landing approach will activate the warning device.

* * * * *

18. By amending §§ 23.1043(a)(1) and (d) by deleting the words "maximum anticipated air temperature" and inserting in their place the words "maximum ambient atmospheric temperature" and by revising § 23.1043(b) to read as follows:

**§ 23.1043 Cooling tests.**

* * * * *

(b) *Maximum ambient atmospheric temperature.* A maximum ambient atmospheric temperature corresponding to sea level conditions of at least 100 degrees F must be established. The assumed temperature lapse rate is 3.6 degrees F per thousand feet of altitude above sea level until a temperature of −69.7 degrees F is reached, above which altitude the temperature is considered constant at −69.7 degrees F. However, for winterization installations, the applicant may select a maximum ambient atmospheric temperature corresponding to sea level conditions of less than 100 degrees F.

* * * * *

**§ 23.1047 [Amended]**

19. By amending § 23.1047 by striking the reference to "§ 23.65(a)(1)" in § 23.1047(b)(1) and by inserting "§ 23.65" in its place.

20. By adding a new § 23.1353(g) to read as follows:

**§ 23.1353 Storage battery design and installation.**

* * * * *

(g) 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 battery failure.

21. By revising § 23.1501 to read as follows:

**§ 23.1501 General.**

(a) Each operating limitation specified in §§ 23.1505 through 23.1527 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to the crewmembers as prescribed in §§ 23.1541 through 23.1589.

22. By adding a new § 23.1521(e) to read as follows:

**§ 23.1521 Powerplant limitations.**

* * * * *

(e) *Ambient temperature.* For turbine engines, ambient temperature limitations (including limitations for winterization installations if applicable) must be established as the maximum ambient atmospheric temperature at which compliance with the cooling provisions of §§ 23.1041 through 23.1047 is shown.

23. By revising § 23.1523 to read as follows:

**§ 23.1523 Minimum flight crew.**

The minimum flight crew must be established so that it is sufficient for safe operation considering—

(a) The workload on individual crewmembers;

(b) The accessibility and ease of operation of necessary controls by the appropriate crewmember; and

(c) The kinds of operation authorized under § 23.1525.

24. By deleting § 23.1541(d) and by revising § 23.1541(c) to read as follows:

**§ 23.1541 General.**

* * * * *

(c) For airplanes which are to be certificated in more than one category—

(1) The applicant must select one category upon which the placards and markings are to be based; and

(2) The placards and marking information for all categories in which the airplane is to be certificated must be furnished in the Airplane Flight Manual.

25. By striking the word "and" from § 23.1555(c)(2), redesignating § 23.1555(c)(3) as (c)(4), and by adding a new (c)(3), and amending § 23.1555(d) to read as follows:

**§ 23.1555 Control markings.**

* * * * *

(c) * * *

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

* * * * *

(d) 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.

* * * * *

26. By deleting § 23.1559(a)(3), by striking the words "of more than 6,000 pounds maximum weight" from the first sentence of § 23.1559(a)(2), and by revising § 23.1559(a)(1) to read as follows:

**§ 23.1559 Operations limitations placard.**

(a) * * *

(1) For airplanes certificated in one category: The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the _____ category. (Insert category.) Other operating limitations which must be complied with when operating this airplane in this category are contained in the Airplane Flight Manual.

* * * * *

27. By revising § 23.1567(b) to read as follows:

**§ 23.1567 Flight maneuver placard.**

* * * * *

(b) For utility category airplanes, there must be—

(1) A placard in clear view of the pilot stating: "Acrobatic maneuvers are limited to the following _____" (list approved maneuvers and the recommended entry speed for each); and

(2) For those airplanes that do not meet the spin requirements for acrobatic category airplanes, an additional placard in clear view of the pilot stating: "Spins Prohibited."

* * * * *

28. By deleting § 23.1581(c) and marking it "[Reserved]", by revising §§ 23.1581 (a) and (b), and by adding a new § 23.1581(d) to read as follows:

**§ 23.1581 General.**

(a) *Furnishing information.* An Airplane Flight Manual must be furnished with each airplane, and it must contain the following:

(1) Information required by §§ 23.1583 through 23.1589.

(2) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) *Approved information.* (1) Except as provided in paragraph (b)(2) of this section, each part of the Airplane Flight Manual containing information prescribed in §§ 23.1583 through 23.1589 must be approved, segregated, identified and clearly distinguished from each unapproved part of that Airplane Flight Manual.

(2) The requirements of paragraph (b)(1) of this section do not apply if the following is met:

(i) Each part of the Airplane Flight Manual containing information prescribed in § 23.1583 must be limited to such information, and must be approved, identified, and clearly distinguished from each other part of the Airplane Flight Manual.

(ii) The information prescribed in §§ 23.1585 through 23.1589 must be determined in accordance with the applicable requirements of this part and presented in its entirety in a manner acceptable to the Administrator.

(3) Each page of the Airplane Flight Manual containing information pre-

scribed 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.

(c) [Reserved]

(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.

29. By deleting § 23.1583(j) and marking it "[Reserved]", and by revising § 23.1583(b) to read as follows:

**§ 23.1583 Operating limitations.**

* * * * *

(b) *Powerplant limitations.* The following information must be furnished:

(1) Limitations required by § 23.1521.

(2) Explanation of the limitations, when appropriate.

(3) Information necessary for marking the instruments required by §§ 23.1549 through 23.1553.

* * * * *

30. By deleting § 23.1585(b) and marking it "[Reserved]", and by revising § 23.1585(a) and adding new §§ 23.1585 (c)(4) and (e) to read as follows:

**§ 23.1585 Operating procedures.**

(a) For each airplane, information concerning normal and emergency procedures and other pertinent information necessary to safe operation must be furnished, including—

(1) The demonstrated crosswind velocity and procedures and information pertinent to operation of the airplane in crosswinds; and

(2) The airspeeds, procedures, and information pertinent to the use of the following airspeeds:

(i) The recommended climb speed and any variation with altitude.

(ii) $V_x$ and any variation with altitude.

(iii) The approach speeds, including speeds for transition to the balked landing condition.

(b) [Reserved]

(c) * * *

(4) Procedures for takeoff determined in accordance with § 23.51.

* * * * *

(e) For each airplane showing compliance with §§ 23.1353 (g)(2) or (g)(3), the operating procedures for disconnecting the battery from its charging source must be furnished.

31. By revising § 23.1587 to read as follows:

**§ 23.1587 Performance information.**

(a) *General.* For each airplane, the following information must be furnished:

(1) Any loss of altitude more than 100 feet, or any pitch more than 30 degrees below flight level, occurring during the recovery part of the maneuver prescribed in § 23.201(b).

(2) The conditions under which the full amount of usable fuel in each tank can safely be used.

(3) The stalling speed, $V_{S_0}$, at maximum weight.

(4) The stalling speed, $V_{S_1}$, at maximum weight and with landing gear and wing flaps retracted, and the effect upon this stalling speed of angles of bank up to 60 degrees.

(5) The takeoff distance determined under § 23.51, the airspeed at the 50-foot height, the airplane configuration (if pertinent), the kind of surface in the tests, and the pertinent information with respect to cowl flap position, use of flight path control devices, and use of the landing gear retraction system.

(6) The landing distance determined under § 23.75, the airplane configuration (if pertinent), the kind of surface used in the tests, and the pertinent information with respect to flap position and the use of flight path control devices.

(7) The steady rate or gradient of climb determined under §§ 23.65 and 23.77, the airspeed, power, and the airplane configuration.

(8) The calculated approximate effect on takeoff distance (paragraph (a)(5) of this section), landing distance (paragraph (a)(6) of this section), and steady rates of climb (paragraph (a)(7) of this section), of variations in—

(i) Altitude from sea level to 8,000 feet; and

(ii) Temperature at these altitudes from 60 degrees F below standard to 40 degrees F above standard.

(9) For reciprocating engine-powered airplanes, the maximum atmospheric temperature at which compliance with the cooling provisions of §§ 23.1041 through 23.1047 is shown.

(b) *Skiplanes.* For skiplanes, a statement of the approximate reduction in climb performance may be used instead of complete new data for skiplane configuration, if—

(1) The landing gear is fixed in both landplane and skiplane configurations;

(2) The climb requirements are not critical; and

(3) The climb reduction in the skiplane configurations is small (30 to 50 feet per minute).

(c) *Multiengine airplanes.* For multiengine airplanes, the following information must be furnished:

(1) The loss of altitude during the one-engine-inoperative stall shown under § 23.205 (as measured from the altitude at which the airplane starts to pitch uncontrollably to the altitude at which level flight is regained) and the pitch angle during that maneuver.

(2) The best rate of climb speed or the minimum rate of descent speed with one engine inoperative.

(3) The speed used in showing compliance with the cooling and climb requirements of § 23.1047(d)(5), if this speed is greater than the best rate of climb speed with one engine inoperative.

(4) The steady rate or gradient of climb determined under § 23.67 and the airspeed, power, and airplane configuration.

(5) The calculated approximate effect on the climb performance determined under § 23.67 of variations in—

(i) Altitude from sea level to 8,000 feet in a standard atmosphere and cruise configuration; and

(ii) Temperature, at those altitudes, from 60 degrees F below standard to 40 degrees F above standard.

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## PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

32. By deleting "—measured at a height of six feet above the runway." in the last phrase of § 25.21(d) and by adding a period in its place, and by adding a new § 25.21(f) to read as follows:

**§ 25.21 Proof of compliance.**

* * * * *

(f) In meeting the requirements of §§ 25.105(d), 25.125, 25.233, and 25.237, the wind velocity must be measured at a height of 10 meters above the surface, or corrected for the difference between the height at which the wind velocity is measured and the 10-meter height.

33. By amending § 25.29 by adding the word "and" at the end of paragraph (a)(2); by deleting paragraph (a)(4); and by revising paragraph (a)(3) to read as follows:

**§ 25.29 Empty weight and corresponding center of gravity.**

(a) * * *

(3) Full operating fluids, including—

(i) Oil;

(ii) Hydraulic fluid; and

(iii) Other fluids required for normal operation of airplane systems, except potable water, lavatory precharge water, and water intended for injection in the engines.

* * * * *

34. By revising § 25.107(a), (d), and (e)(1)(iv) to read as follows:

**§ 25.107 Takeoff speeds.**

(a) $V_1$ must be established in relation to $V_{EF}$ as follows:

(1) $V_{EF}$ is the calibrated airspeed at which the critical engine is assumed to fail. $V_{EF}$ must be selected by the applicant, but may not be less than $V_{MCG}$ determined under § 25.149(e).

(2) $V_1$, in terms of calibrated airspeed, is the takeoff decision speed selected by the applicant; however, $V_1$ may not be less than $V_{EF}$ plus the speed gained with the critical engine inoperative during the time interval between the instant at which the critical engine is failed, and the instant at which the pilot recognizes and reacts to the engine failure, as indicated by the pilot's application of the first retarding means during accelerate-stop tests.

* * * * *

(d) $V_{MU}$ is the calibrated airspeed at and above which the airplane can safely lift off the ground, and continue the takeoff. $V_{MU}$ speeds must be selected by the applicant throughout the range of thrust-to-weight ratios to be certificated. These speeds may be established from free air data if these data are verified by ground takeoff tests.

(e) * * *
(1) * * *
(iv) A speed that, if the airplane is rotated at its maximum practicable rate, will result in a $V_{LOF}$ of not less than 110 percent of $V_{MU}$ in the all-engines-operating condition and not less than 105 percent of $V_{MU}$ determined at the thrust-to-weight ratio corresponding to the one-engine-inoperative condition.

* * * * *

35. By revising § 25.109(a) to read as follows:

**§ 25.109 Accelerate-stop distance.**

(a) The accelerate-stop distance is the greater of the following distances:

(1) The sum of the distances necessary to—

(i) Accelerate the airplane from a standing start to $V_{EF}$ with all engines operating;

(ii) Accelerate the airplane from $V_{EF}$ to $V_1$ and continue the acceleration for 2.0 seconds after $V_1$ is reached, assuming the critical engine fails at $V_{EF}$; and

(iii) Come to a full stop from the point reached at the end of the acceleration period prescribed in paragraph (a)(1)(ii) of this section, assuming that the pilot does not apply any means of retarding the airplane until that point is reached and that the critical engine is still inoperative.

(2) The sum of the distances necessary to—

(i) Accelerate the airplane from a standing start to $V_1$ and continue the acceleration for 2.0 seconds after $V_1$ is reached with all engines operating; and

(ii) Come to a full stop from the point reached at the end of the acceleration period prescribed in paragraph (a)(2)(i) of this section, assuming that the pilot does not apply any means of retarding the airplane until that point is reached and that all engines are still operating.

* * * * *

**§ 25.111 [Amended]**

36. By amending §§ 25.111(a)(2) and (a)(3) by deleting the symbol "$V_1$" and substituting in both places the symbol "$V_{EF}$".

37. By amending § 25.143 by deleting the value "180" under the column heading "Yaw" in the table of § 25.143(c) and inserting the value "150" in its place, and by revising § 25.143(b) to read as follows:

**§ 25.143 General.**

* * * * *

(b) It must be possible to make a smooth transition from one flight condition to any other flight condition without exceptional piloting skill, alertness, or strength, and without danger of exceeding the airplane limit-load factor under any probable operating conditions, including—

(1) The sudden failure of the critical engine;

(2) For airplanes with three or more engines, the sudden failure of the second critical engine when the airplane is in the en route, approach, or landing configuration and is trimmed with the critical engine inoperative; and

(3) Configuration changes, including deployment or retraction of deceleration devices.

* * * * *

**§ 25.147 [Amended]**

38. By amending § 25.147 by deleting the number "180" in paragraph (a) and inserting in its place the number "150".

39. By amending § 25.149 by—

1. Deleting paragraph (b) and redesignating paragraph (a) as paragraph (b);

2. Deleting the number "180" in paragraph (d) and inserting in its place the number "150"; and

3. By deleting the word "and" after (c)(5); by deleting the period at the end of (c)(6) and inserting in its place a semicolon and the word "and"; and by revising the paragraph (c) lead-in and adding new paragraphs (a), (c)(7), (e), (f), (g), and (h) to read as follows:

**§ 25.149 Minimum control speed.**

(a) In establishing the minimum control speeds required by this section, the method used to simulate critical engine failure must represent the most critical mode of powerplant failure with respect to controllability expected in service.

* * * * *

(c) $V_{MC}$ may not exceed 1.2 Vs with—

* * * * *

(7) If applicable, the propeller of the inoperative engine—

(i) Windmilling;

(ii) In the most probable position for the specific design of the propeller control; or

(iii) Feathered, if the airplane has an automatic feathering device acceptable for showing compliance with the climb requirements of § 25.121.

* * * * *

(e) $V_{MC_G}$, the minimum control speed on the ground, is the calibrated airspeed during the takeoff run, at which, when the critical engine is suddenly made inoperative, it is possible to recover control of the airplane with the use of primary aerodynamic controls alone (without the use of nose-wheel steering) to enable the takeoff to be safely continued using normal piloting skill and rudder control forces not exceeding 150 pounds. In the determination of $V_{MC_G}$, assuming that the path of the airplane accelerating with all engines operating is along the centerline of the runway, its path from the point at which the critical engine is made inoperative to the point at which recovery to a direction parallel to the centerline is completed may not deviate more than 30 feet laterally from the centerline at any point. $V_{MC_G}$ must be established with—

(1) The airplane in each takeoff configuration or, at the option of the applicant, in the most critical takeoff configuration;

(2) Maximum available takeoff power or thrust on the operating engines;

(3) The most unfavorable center of gravity;

(4) The airplane trimmed for takeoff; and

(5) The most unfavorable weight in the range of takeoff weights.

(f) $V_{MCL}$, the minimum control speed during landing approach with all engines operating, is the calibrated airspeed at which, when the critical engine is suddenly made inoperative, it is possible to recover control of the airplane with that engine still inoperative, and maintain straight flight either with zero yaw or, at the option of the applicant, with an angle of bank of not more than 5 degrees. $V_{MCL}$ must be established with—

(1) The airplane in the most critical configuration for approach with all engines operating;

(2) The most unfavorable center of gravity;

(3) The airplane trimmed for approach with all engines operating;

(4) The maximum sea level landing weight (or any lesser weight necessary to show $V_{MCL}$); and

(5) Maximum available takeoff power or thrust on the operating engines.

(g) For airplanes with three or more engines, $V_{MCL-2}$, the minimum control speed during landing approach with one critical engine inoperative, is the calibrated airspeed at which, when a second critical engine is suddenly made inoperative, it is possible to recover control of the airplane with both engines still inoperative and maintain straight flight either with zero yaw or, at the option of the applicant, with an angle of bank of not more than 5 degrees. $V_{MCL-2}$, must be established with—

(1) The airplane in the most critical configuration for approach with the critical engine inoperative;

(2) The most unfavorable center of gravity;

(3) The airplane trimmed for approach with the critical engine inoperative;

(4) The maximum sea level landing weight (or any lesser weight necessary to show $V_{MCL-2}$);

(5) The power or thrust on the operating engines required to maintain an approach path angle of 3 degrees when one critical engine is inoperative; and

(6) The power or thrust on the operating engines rapidly changed, immediately after the second critical engine is made inoperative, from the power or thrust prescribed in paragraph (g)(5) of this section to—

(i) Minimum available power or thrust; and

(ii) Maximum available takeoff power or thrust.

(h) The rudder control forces required to maintain control at $V_{MCL}$ and $V_{MCL-2}$ may not exceed 150 pounds, nor may it be necessary to reduce the power or thrust of the operating engines. In addition, the airplane may not assume any dangerous attitudes or require exceptional piloting skill, alertness, or

strength to prevent a divergence in the approach flight path that would jeopardize continued safe approach when—

(1) The critical engine is suddenly made inoperative; and

(2) For the determination of $V_{MCL-2}$, the power or thrust on the operating engines is changed in accordance with paragraph (g)(6) of this section.

40. By revising § 25.177(b) to read as follows:

**§ 25.177 Static directional and lateral stability.**

* * * * *

(b) The static lateral stability (as shown by the tendency to raise the low wing in a sideslip with the aileron controls free and for any landing gear and flap position and symmetrical power condition) may not be negative at any airspeed (except speeds higher than $V_{FE}$ or $V_{LE}$, when appropriate) in the following airspeed ranges:

(1) From 1.2 $V_{S_1}$ to $V_{MO}/M_{MO}$.

(2) From $V_{MO}/M_{MO}$ to $V_{FC}/M_{FC}$ unless the Administrator finds that the divergence is—

(i) Gradual;

(ii) Easily recognizable by the pilot; and

(iii) Easily controllable by the pilot.

* * * * *

41. By revising § 25.181 and its heading to read as follows:

**§ 25.181 Dynamic stability.**

(a) Any short period oscillation, not including combined lateral-directional oscillations, occurring between stalling speed and maximum allowable speed appropriate to the configuration of the airplane must be heavily damped with the primary controls—

(1) Free; and

(2) In a fixed position.

(b) Any combined lateral-directional oscillations ("Dutch roll") occurring between stalling speed and maximum allowable speed appropriate to the configuration of the airplane must be positively damped with controls free, and must be controllable with normal use of the primary controls without requiring exceptional pilot skill.

42. By deleting § 25.201(c)(2), redesignating § 25.201 (c)(3) as (c)(2), and by adding a new § 25.201(d) to read as follows:

**§ 25.201 Stall demonstration.**

* * * * *

(d) Occurrence of stall is defined as follows:

(1) The airplane may be considered stalled when, at an angle of attack measurably greater than that for maximum lift, the inherent flight characteristics give a clear and distinctive indication to the pilot that the airplane is stalled. Typical indications of a stall, occurring either individually or in combination, are—

(i) A nose-down pitch that cannot be readily arrested;

(ii) A roll that cannot be readily arrested; or

(iii) If clear enough, a loss of control effectiveness, an abrupt change in control force or motion, or a distinctive shaking of the pilot's controls.

(2) For any configuration in which the airplane demonstrates an unmistakable inherent aerodynamic warning of a magnitude and severity that is a strong and effective deterrent to further speed reduction, the airplane may be considered stalled when it reaches the speed at which the effective deterrent is clearly manifested.

43. By deleting the term "§ 25.201(c)(2)" in § 25.207(c) and inserting in its place the term "§ 25.201(d)", and by adding a sentence at the end of § 25.207 (b) to read as follows:

**§ 25.207 Stall warning.**

* * * * *

(b) * * * If a warning device is used, it must provide a warning in each of the airplane configurations prescribed in paragraph (a) of this section at the speed prescribed in paragraph (c) of this section.

* * * * *

**§ 25.233 [Amended]**

44. By amending § 25.233(a) by deleting "0.2 $V_{S_0}$" and substituting "20 knots or 0.2 $V_{S_0}$, whichever is greater, except that the wind velocity need not exceed 25 knots."

45. By revising § 25.237 to read as follows:

**§ 25.237 Wind velocities.**

(a) For landplanes and amphibians, a 90-degree cross component of wind velocity, demonstrated to be safe for takeoff and landing, must be established for dry runways and must be at least 20 knots or 0.2 $V_{S_0}$, whichever is greater, except that it need not exceed 25 knots.

(b) For seaplanes and amphibians, the following applies:

(1) A 90-degree cross component of wind velocity, up to which takeoff and landing is safe under all water conditions that may reasonably be expected in normal operation, must be established and must be at least 20 knots or 0.2 $V_{S_0}$, whichever is greater, except that it need not exceed 25 knots.

(2) A wind velocity, for which taxiing is safe in any direction under all water conditions that may reasonably be expected in normal operation, must be established and must be at least 20 knots or 0.2 $V_{S_0}$, whichever is greater, except that it need not exceed 25 knots.

46. By adding a new § 25.255 following § 25.253 to read as follows:

**§ 25.255 Out-of-trim characteristics.**

(a) From an initial condition with the airplane trimmed at cruise speeds up to $V_{MO}/M_{MO}$, the airplane must have satisfactory maneuvering stability and controllability with the degree of out-of-trim in both the airplane nose-up and nose-down directions, which results from the greater of—

(1) A three-second movement of the longitudinal trim system at its normal rate for the particular flight condition with no aerodynamic load (or an equivalent degree of trim for airplanes that do not have a power-operated trim system), except as limited by stops in the trim system, including those required by § 25.655(b) for adjustable stabilizers; or

(2) The maximum mistrim that can be sustained by the autopilot while maintaining level flight in the high speed cruising condition.

(b) In the out-of-trim condition specified in paragraph (a) of this section, when the normal acceleration is varied from +1 g to the positive and negative values specified in paragraph (c) of this section—

(1) The stick force vs. g curve must have a positive slope at any speed up to and including $V_{FC}/M_{FC}$; and

(2) At speeds between $V_{FC}/M_{FC}$ and $V_{DF}/M_{DF}$ the direction of the primary longitudinal control force may not reverse.

(c) Except as provided in paragraphs (d) and (e) of this section, compliance with the provisions of paragraph (a) of this section must be demonstrated in flight over the acceleration range—

(1) −1 g to +2.5 g; or

(2) 0 g to 2.0 g, and extrapolating by an acceptable method to −1 g and +2.5 g.

(d) If the procedure set forth in paragraph (c)(2) of this section is used to demonstrate compliance and marginal conditions exist during flight test with regard to reversal of primary longitudinal control force, flight tests must be accomplished from the normal acceleration at which a marginal condition is found to exist to the applicable limit specified in paragraph (b)(1) of this section.

(e) During flight tests required by paragraph (a) of this section, the limit maneuvering load factors prescribed in §§ 25.333(b) and 25.337, and the maneuvering load factors associated with probable inadvertent excursions beyond the boundaries of the buffet onset envelopes determined under § 25.251(e), need not be exceeded. In addition, the entry speeds for flight test demonstrations at normal acceleration values less than 1 g must be limited to the extent necessary to accomplish a recovery without exceeding $V_{DF}/M_{DF}$.

(f) In the out-of-trim condition specified in paragraph (a) of this section, it must be possible from an overspeed condition at $V_{DF}/M_{DF}$ to produce at least 1.5 g for recovery by applying not more than 125 pounds of longitudinal control force using either the primary longitudinal control alone or the primary longitudinal control and the longitudinal trim system. If the longitudinal trim is used to assist in producing the required load factor, it must be shown at $V_{DF}/M_{DF}$ that the longitudinal trim can be actuated in the airplane nose-up direction with the primary surface loaded to correspond to the least of the following airplane nose-up control forces:

(1) The maximum control forces expected in service as specified in §§ 25.301 and 25.397.

(2) The control force required to produce 1.5 g.

(3) The control force corresponding to buffeting or other phenomena of such intensity that it is a strong deterrent to further application of primary longitudinal control force.

47. By adding a new § 25.703 following § 25.701 to read as follows:

**§ 25.703 Takeoff warning system.**

A takeoff warning system must be installed and must meet the following requirements:

(a) The system must provide to the pilots an aural warning that is automatically activated during the initial portion of the takeoff roll if the airplane is in a configuration, including any of the following, that would not allow a safe takeoff:

(1) The wing flaps or leading edge devices are not within the approved range of takeoff positions.

(2) Wing spoilers (except lateral control spoilers meeting the requirements of § 25.671), speed brakes, or longitudinal trim devices are in a position that would not allow a safe takeoff.

(b) The warning required by paragraph (a) of this section must continue until—

(1) The configuration is changed to allow a safe takeoff;

(2) Action is taken by the pilot to terminate the takeoff roll;

(3) The airplane is rotated for takeoff; or

(4) The warning is manually deactivated by the pilot.

(c) The means used to activate the system must function properly throughout the ranges of takeoff weights, altitudes, and temperatures for which certification is requested.

48. By revising § 25.729(e)(3) to read as follows:

**§ 25.729 Retracting mechanism.**

* * * * *

(e) * * *

(3) If there is a manual shutoff for the aural warning device prescribed in paragraph (e)(2) of this section, the warning system must be designed so that, when the warning has been suspended after one or more throttles are closed, subsequent retardation of any throttle to or beyond the position for a normal landing approach will activate the aural warning.

* * * * *

49. By revising § 25.1043(b) to read as follows:

**§ 25.1043 Cooling tests.**

* * * * *

(b) *Maximum ambient atmospheric temperature.* A maximum ambient atmospheric temperature corresponding to sea level conditions of at least 100 degrees F must be established. The assumed temperature lapse rate is 3.6 degrees F per thousand feet of altitude above sea level until a temperature of −69.7 degrees F is reached, above which altitude the temperature is considered constant at −69.7 degrees F. However, for winterization installations, the applicant may select a maximum ambient atmospheric temperature corresponding to sea level conditions of less than 100 degrees F.

* * * * *

50. By adding a new § 25.1353(c)(6) to read as follows:

**§ 25.1353 Electrical equipment and installations.**

* * * * *

(c) * * *

(6) 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.

51. By revising § 25.1501 to read as follows:

**§ 25.1501 General.**

(a) Each operating limitation specified in §§ 25.1503 through 25.1533 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to the crewmembers as prescribed in §§ 25.1541 through 25.1587.

52. By revising § 25.1521(e) to read as follows:

**§ 25.1521 Powerplant limitations.**

* * * * *

(e) *Ambient temperature.* Ambient temperature limitations (including limitations for winterization installations if applicable) must be established as the maximum ambient atmospheric temperature at which compliance with the cooling provisions of §§ 25.1041 through 25.1045 is shown.

53. By deleting § 25.1581(c) and marking it "[Reserved]"; and by revising § 25.1581 (a) and (b) and adding a new § 25.1581(d) to read as follows:

**§ 25.1581 General.**

(a) *Furnishing information.* An Airplane Flight Manual must be furnished with each airplane, and it must contain the following:

(1) Information required by §§ 25.1583 through 25.1587.

(2) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) *Approved information.* Each part of the manual listed in §§ 25.1583 through 25.1587, that is appropriate to the airplane, must be furnished, verified, and approved, and must be segregated, identified, and clearly distinguished from each unapproved part of that manual.

(c) [Reserved]

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

54. By revising § 25.1583 (b) and (c) and by adding a new § 25.1583(i) to read as follows:

**§ 25.1583 Operating limitations.**

* * * * *

(b) *Powerplant limitations.* The following information must be furnished:

(1) Limitations required by § 25.1521.

(2) Explanation of the limitations, when appropriate.

(3) Information necessary for marking the instruments required by §§ 25.1549 through 25.1553.

(c) *Weight and loading distribution.* The weight and center of gravity limits required by §§ 25.25 and 25.27 must be furnished in the Airplane Flight Manual. All of the following information must be presented either in the Airplane Flight Manual or in a separate weight and balance control and loading document which is incorporated by reference in the Airplane Flight Manual:

(1) The condition of the airplane and the items included in the empty weight as defined in accordance with § 25.29.

(2) Loading instructions necessary to ensure loading of the airplane within the weight and center of gravity limits, and to maintain the loading within these limits in flight.

(3) If certification for more than one center of gravity range is requested, the appropriate limitations, with regard to weight and loading procedures, for each separate center of gravity range.

* * * * *

(i) *Maneuvering flight load factors.* The positive maneuvering limit load factors for which the structure is proven, described in terms of accelerations, and a statement that these accelerations limit the angle of bank in turns and limit the severity of pull-up maneuvers, must be furnished.

55. By deleting the word "and" from the end of §§ 25.1585(a)(6) and (a)(9); by adding a semicolon and the word "and" at the end of §§ 25.1585(a)(9); and by revising §§ 25.1595(a)(7) and (c) and adding a new § 25.1585(a)(10) to read as follows.

**§ 25.1585 Operating procedures.**

(a) * * *

(7) Use of fuel jettisoning equipment, including any operating precautions relevant to the use of the system;

* * * * *

(10) Disconecting the battery from its charging source, if compliance is shown with § 25.1353(c)(6)(ii) or (c)(6)(iii).

* * * * *

(c) The buffet onset envelopes determined under § 25.251 must be furnished. The buffet onset envelopes presented may reflect the center of gravity at which the airplane is normally loaded

during cruise if corrections for the effect of different center of gravity locations are furnished.

56. 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) Vs 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 (f), (g), and (h) 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.

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## PART 27—AIRWORTHINESS STANDARDS: NORMAL CATEGORY ROTORCRAFT

**§ 27.25 [Amended]**

57. By deleting § 27.25(b)(1)(iii) and adding the word "and" at the end of § 27.25(b)(1)(i).

58. By amending § 27.29 by adding the word "and" at the end of paragraph (a)(2); by deleting paragraphs (a)(4) and (a)(5) and by revising paragraph (a)(3) to read as follows:

**§ 27.29 Empty weight and corresponding center of gravity.**

(a) * * *

(3) Full operating fluids, including—

(i) Oil;

(ii) Hydraulic fluid; and

(iii) Other fluids required for normal operation of rotorcraft systems, except water intended for injection in the engines.

* * * * *

59. By revising the lead in of § 27.33 (b) and by adding a new § 27.33(e) to read as follows:

**§ 27.33 Main rotor speed and pitch limits.**

* * * * *

(b) *Normal main rotor high pitch limits (power-on).* For rotorcraft, except helicopters required to have a main rotor low speed warning under paragraph (e) of this section, it must be shown with power on and without exceeding approved engine maximum limitations, that main rotor speeds substantially less than the minimum approved main rotor speed will not occur under any sustained flight condition. This must be met by— * * *

* * * * *

(e) *Main rotor low speed warning for helicopters.* For each single engine helicopter, and each multiengine helicopter that does not have an approved device that automatically increases power on the operating engines when one engine fails, there must be a main rotor low speed warning which meets the following requirements:

(1) The warning must be furnished to the pilot in all flight conditions, including power-on and power-off flight, when the speed of a main rotor approaches a value that can jeopardize safe flight.

(2) The warning may be furnished either through the inherent aerodynamic qualities of the helicopter or by a device.

(3) The warning must be clear and distinct under all conditions, and must be clearly distinguishable from all other warnings. A visual device that requires the attention of the crew within the cockpit is not acceptable by itself.

(4) If a warning device is used, the device must automatically deactivate and reset when the low-speed condition is corrected. If the device has an audible warning, it must also be equipped with a means for the pilot to manually silence the audible warning before the low-speed condition is corrected.

60. By revising § 27.45 including the heading to read as follows:

**§ 27.45 General.**

(a) Unless otherwise prescribed, the performance requirements of this subpart must be met for still air and a standard atmosphere.

(b) The performance must correspond to the engine power available under the particular ambient atmospheric conditions, the particular flight condition, and the relative humidity specified in paragraphs (d) or (e) of this section, as appropriate.

(c) The available power must correspond to engine power, not exceeding the approved power, less—

(1) Installation losses; and

(2) The power absorbed by the accessories and services appropriate to the particular ambient atmospheric conditions and the particular flight condition.

(d) For reciprocating engine-powered rotorcraft, the performance, as affected by engine power, must be based on a relative humidity of 80 percent in a standard atmosphere.

(e) For turbine engine-powered rotorcraft, the performance, as affected by engine power, must be based on a relative humidity of—

(1) 80 percent, at and below standard temperature; and

(2) 34 percent, at and above standard temperature plus 50 degrees F. Between these two temperatures, the relative humidity must vary linearly.

61. By changing the heading of § 27.65 and by revising §§ 27.65 (a)(2) and (b) to read as follows:

**§ 27.65 Climb: All engines operating.**

(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 under standard sea level conditions.

(b) Each helicopter must meet the following requirements:

(1) $V_Y$ must be determined—

(i) For standard sea level conditions;

(ii) At maximum weight; and

(iii) With maximum continuous power on each engine.

(2) If at any altitude within the range for which certification is requested, $V_{NE}$ is less than $V_Y$ the steady rate of climb must be determined—

(i) At the climb speed selected by the applicant at or below $V_{NE}$;

(ii) Within the range from 2,000 feet below the altitude at which $V_{NE}$ is equal to $V_Y$ up to the maximum altitude for which certification is requested;

(iii) For the weights and temperatures that correspond to the altitude range set forth in paragraph (b)(2)(ii) of this section and for which certification is requested; and

(iv) With maximum continuous power on each engine.

62. By revising § 27.67(c) to read as follows:

**§ 27.67 Climb: one engine inoperative.**

* * * * *

(c) Maximum continuous power on the other engines and (for helicopters for which certification for the use of 30-minute power is requested) at 30-minute power.

63. By revising § 27.75(a)(2)(ii) to read as follows:

**§ 27.75 Landing.**

(a) * * *

(2) * * *

(ii) For multiengine rotorcraft, one engine inoperative and with each operating engine within approved operating limitations; and

* * * * *

64. By revising § 27.143(b) and adding a new § 27.143(e) to read as follows:

**§ 27.143 Controllability and maneuverability.**

* * * * *

(b) The margin of cyclic control must allow satisfactory roll and pitch control at $V_{NE}$ with—

(1) Critical weight;

(2) Critical center of gravity;

(3) Critical rotor r.p.m.; and

(4) Power off (except for helicopters demonstrating compliance with paragraph (e) of this section) and power on.

* * * * *

(e) For helicopters for which a $V_{NE}$ (power-off) is established under § 27.1505 (c), compliance must be demonstrated with the following requirements with critical weight, critical center of gravity, and critical rotor r.p.m.:

(1) The helicopter must be safely slowed to $V_{NE}$ (power-off), without exceptional pilot skill, after the last operating engine is made inoperative at power-on $V_{NE}$.

(2) At a speed of 1.1 $V_{NE}$ (power-off), the margin of cyclic control must allow satisfactory roll and pitch control with power off.

65. By revising § 27.175(c) to read as follows:

**§ 27.175 Demonstration of static longitudinal stability.**

* * * * *

(c) *Autorotation.* Static longitudinal stability must be shown in autorotation at airspeeds from 0.5 times the speed for minimum rate of descent to $V_{NE}$, or to 1.1 $V_{NE}$ (power-off) if $V_{NE}$ (power-off) is established under § 27.1505(c), and with—

(1) Critical weight;

(2) Critical center of gravity;

(3) Power off;

(4) The landing gear—

(i) Retracted; and

(ii) Extended; and

(5) The rotorcraft trimmed at appropriate speeds found necessary by the Administrator to demonstrate stability throughout the prescribed speed range.

* * * * *

66. By amending §§ 27.1043 (a)(1) and (d) by deleting the words "maximum anticipated air temperature" and inserting in their place the words "maximum ambient atmospheric temperature", and by revising the lead-in of § 27.1043(a) and revising § 27.1043(b) to read as follows:

**§ 27.1043 Cooling tests.**

(a) *General.* For the tests prescribed in § 27.1041(b), the following apply:

* * * * *

(b) *Maximum ambient atmospheric temperature.* A maximum ambient atmospheric temperature corresponding to sea level conditions of at least 100 degrees F must be established. The assumed temperature lapse rate is 3.6 degrees F per thousand feet of altitude above sea level until a temperature of −69.7 degrees F is reached, above which altitude the temperature is considered constant at −69.7 degrees F. However, for winterization installations, the applicant may select a maximum ambient atmospheric temperature corresponding to sea level conditions of less than 100 degrees F.

* * * * *

67. By adding a new § 27.1353(g) to read as follows:

**§ 27.1353 Storage battery design and installation.**

* * * * *

(g) 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 battery failure.

68. By revising § 27.1501 to read as follows:

**§ 27.1501 General.**

(a) Each operating limitation specified in §§ 27.1503 through 27.1525 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to the crewmembers as prescribed in §§ 27.1541 through 27.1589.

69. By revising § 27.1505(a) and adding a new § 27.1505(c) to read as follows:

**§ 27.1505 Never-exceed speed.**

(a) The never-exceed speed, $V_{NE}$, must be established so that it is—

(1) Not less than 40 knots (CAS); and

(2) Not more than the lesser of—

(i) 0.9 times the maximum forward speeds established under § 27.309; or

(ii) 0.9 times the maximum speed shown under §§ 27.251 and 27.629.

* * * * *

(c) For helicopters, a stabilized power-off $V_{NE}$ denoted as $V_{NE}$ (power-off) may be established at a speed less than $V_{NE}$ established pursuant to paragraph (a) of this section, if the following conditions are met:

(1) $V_{NE}$ (power-off) is not less than a speed midway between the power-on $V_{NE}$ and the speed used in meeting the requirements of—

(i) § 27.65(b) for single engine helicopters; and

(ii) § 27.67 for multiengine helicopters.

(2) $V_{NE}$ (power-off) is—

(i) A constant airspeed;

(ii) A constant amount less than power-on $V_{NE}$; or

(iii) A constant airspeed for a portion of the altitude range for which certification is requested, and a constant amount less than power-on $V_{NE}$ for the remainder of the altitude range.

70. By adding a new § 27.1521(f) to read as follows:

**§ 27.1521 Powerplant limitations.**

* * * * *

(f) *Ambient temperature.* For turbine engines, ambient temperature limitations (including limitations for winterization installations, if applicable) must be established as the maximum ambient atmospheric temperature at which compliance with the cooling provisions of §§ 27.1041 through 27.1045 is shown.

71. By adding a new § 27.1527 to read as follows:

**§ 27.1527 Maximum operating altitude.**

The maximum altitude up to which operation is allowed, as limited by flight, structural, powerplant, functional, or equipment characteristics, must be established.

72. 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:

**§ 27.1545 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).

* * * * *

73. By deleting § 27.1581(c) and marking it "[Reserved]"; and by revising §§ 27.1581 (a) and (b) and by adding a new § 27.1581(d) to read as follows:

**§ 27.1581 General.**

(a) *Furnishing information.* A Rotorcraft Flight Manual must be furnished with each rotorcraft, and it must contain the following:

(1) Information required by §§ 27.1583 through 27.1589.

(2) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) *Approved information.* Each part of the manual listed in §§ 27.1583 through 27.1589, that is appropriate to the rotorcraft, must be furnished, verified, and approved, and must be segregated, identified, and clearly distinguished from each unapproved part of that manual.

(c) [Reserved]

(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.

74. By revising § 27.1583(b) and adding a new § 27.1583(g) to read as follows:

**§ 27.1583 Operating limitations.**

* * * * *

(b) *Powerplant limitations.* The following information must be furnished:

(1) Limitations required by § 27.1521.

(2) Explanation of the limitations, when appropriate.

(3) Information necessary for marking the instruments required by §§ 27.1549 through 27.1553.

* * * * *

(g) *Altitude.* The altitude established under § 27.1527 and an explanation of the limiting factors must be furnished.

75. By adding new §§ 27.1585(c) and (d) to read as follows:

**§ 27.1585 Operating procedures.**

* * * * *

(c) For helicopters for which a $V_{NE}$ (power-off) is established under § 27.1505(c), information must be furnished to explain the $V_{NE}$ (power-off) and the procedures for reducing airspeed to not more than the $V_{NE}$ (power-off) following failure of all engines.

(d) For each rotorcraft showing compliance with § 27.1353 (g)(2) or (g)(3), the operating procedures for disconnecting the battery from its charging source must be furnished.

76. By striking the parenthetical expression "(if provided)" after "Manual" in the lead-in of § 27.1587(b); 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 revising § 27.1587(a) and 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;

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

(iii) For reciprocating engine-powered rotorcraft, the maximum atmospheric temperature at which compliance with the cooling provisions of §§ 27.1041 through 27.1045 is shown.

(b) * * *

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

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## PART 29—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY ROTORCRAFT

77. By amending § 29.29 by adding the word "and" at the end of paragraph (a)(2); by deleting paragraphs (a)(4) and (a)(5); and by revising paragraph (a)(3) to read as follows:

**§ 29.29 Empty weight and corresponding center of gravity.**

(a) * * *

(3) Full operating fluids, including—

(i) Oil;

(ii) Hydraulic fluid; and

(iii) Other fluids required for normal operation of rotorcraft systems, except water intended for injection in the engines.

* * * * *

78. By revising the lead-in of § 29.33 (b) and by adding a new § 29.33(e) to read as follows:

**§ 29.33 Main rotor speed and pitch limits.**

* * * * *

(b) *Normal main rotor high pitch limits (power-on).* For rotorcraft, except helicopters required to have a main rotor low speed warning under paragraph (e) of this section, it must be shown with power on and without exceeding approved engine maximum limitations, that main rotor speeds substantially less than the minimum approved main rotor speed will not occur under any sustained flight condition. This must be met by— * * *

* * * * *

(e) *Main rotor low speed warning for helicopters.* For each single engine helicopter, and each multiengine helicopter that does not have an approved device that automatically increases power on the operating engines when one engine fails, there must be a main rotor low speed warning which meets the following requirements:

(1) The warning must be furnished to the pilot in all flight conditions, including power-on and power-off flight, when the speed of a main rotor approaches a value that can jeopardize safe flight.

(2) The warning may be furnished either through the inherent aerodynamic qualities of the helicopter or by a device.

(3) The warning must be clear and distinct under all conditions, and must be clearly distinguishable from all other warnings. A visual device that requires the attention of the crew within the cockpit is not acceptable by itself.

(4) If a warning device is used, the device must automatically deactivate and reset when the low-speed condition is corrected. If the device has an audible warning, it must also be equipped with a means for the pilot to manually silence the audible warning before the low-speed condition is corrected.

79. By amending § 29.45 as follows:

1. By deleting paragraphs (a)(3) and (b)(3).

2. By deleting the semicolon and the word "and" at the end of paragraphs (a)(2) and (b)(2) and by adding periods in place thereof.

3. By adding the word "and" at the end of paragraphs (a)(1) and (b)(1).

4. By adding new paragraphs (c), (d), and (e) to read as follows:

**§ 29.45 General.**

* * * * *

(c) The available power must correspond to engine power, not exceeding the approved power, less—

(1) Installation losses; and

(2) The power absorbed by the accessories and services appropriate to the particular ambient atmospheric conditions and the particular flight condition.

(d) For reciprocating engine-powered rotorcraft, the performance, as affected by engine power, must be based on a relative humidity of 80 percent in a standard atmosphere.

(e) For turbine engine-powered rotorcraft, the performance, as affected by engine power, must be based on a relative humidity of—

(1) 80 percent, at and below standard temperature; and

(2) 34 percent, at and above standard temperature plus 50 degrees F.

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

80. By changing the heading of § 29.65, by revising § 29.65(a) and by adding a new § 29.65(c) to read as follows:

**§ 29.65 Climb: All engines operating.**

(a) The steady rate of climb must be determined for each Category B rotorcraft—

(1) With maximum continuous power on each engine;

(2) With the landing gear retracted;

(3) For the weights, altitudes, and temperatures for which certification is requested; and

(4) At $V_Y$ for standard sea level conditions at maximum weight and at speeds selected by the applicant at or below $V_{NE}$ for other conditions.

* * * * *

(c) For Category A helicopters, if $V_{NE}$ at any altitude within the range for which certification is requested is less than $V_Y$ at sea level standard conditions, with maximum weight and maximum continuous power, the steady rate of climb must be determined—

(1) At the climb speed selected by the applicant at or below $V_{NE}$;

(2) Within the range from 2,000 feet below the altitude at which $V_{NE}$ is equal to $V_Y$ up to the maximum altitude for which certification is requested;

(3) For the weights and temperatures that correspond to the altitude range set forth in paragraph (c)(2) of this section and for which certification is requested;

(4) With maximum continuous power on each engine; and

(5) With the landing gear retracted.

81. By revising § 29.143(b) and adding a new § 29.143(e) to read as follows:

**§ 29.143 Controllability and maneuverability.**

* * * * *

(b) The margin of cyclic control must allow satisfactory roll and pitch control at $V_{NE}$ with—

(1) Critical weight;

(2) Critical center of gravity;

(3) Critical rotor r.p.m.; and

(4) Power off (except for helicopters demonstrating compliance with paragraph (e) of this section) and power on.

* * * * *

(e) For helicopters for which a $V_{NE}$ (power-off) is established under § 29.1505(c), compliance must be demonstrated with the following requirements with critical weight, critical center of gravity, and critical rotor r.p.m.:

(1) The helicopter must be safely slowed to $V_{NE}$ (power-off), without ex-

ceptional pilot skill after the last operating engine is made inoperative at power-on VNE.

(2) At a speed of 1.1 VNE (power-off), the margin of cyclic control must allow satisfactory roll and pitch control with power off.

82. By revising § 29.175(c) to read as follows:

**§ 29.175 Demonstration of static longitudinal stability.**

* * * * *

(c) *Autorotation.* Static longitudinal stability must be shown in autorotation at airspeeds from 0.5 times the speed for minimum rate of descent to VNE, or to 1.1 VNE (power-off) if VNE (power-off) is established under § 29.1505(c), and with—

(1) Critical weight;

(2) Critical center of gravity;

(3) Power off;

(4) The landing gear——

(i) Retracted; and

(ii) Extended; and

and (ii) extended; and

(5) The rotorcraft trimmed at appropriate speeds found necessary by the Administrator to demonstrate stability throughout the prescribed speed range.

* * * * *

83. By amending §§ 29.1043(a)(1) and (d) by deleting the words "maximum anticipated air temperature" and inserting in their place the words "maximum ambient atmospheric temperature" and by revising § 29.1043(b) to read as follows:

**§ 29.1043 Cooling tests.**

* * * * *

(b) *Maximum ambient atmospheric temperature.* A maximum ambient atmospheric temperature corresponding to sea level conditions of at least 100 degrees F must be established. The assumed temperature lapse rate is 3.6 degrees F per thousand feet of altitude above sea level until a temperature of −69.7 degrees F is reached, above which altitude the temperature is considered constant at −69.7 degrees F. However, for winterization installations, the applicant may select a maximum ambient atmospheric temperature corresponding to sea level conditions of less than 100 degrees F.

* * * * *

84. By adding a new § 29.1353(c)(6) to read as follows:

**§ 29.1353 Electrical equipment and installation.**

* * * * *

(c) * * *

(6) 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.

85. By revising § 29.1501 to read as follows:

**§ 29.1501 General.**

(a) Each operating limitation specified in §§ 29.1503 through 29.1525 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to the crewmembers as prescribed in §§ 29.1541 through 29.1589.

86. By revising § 29.1505(a) and adding a new §29.1505(c) to read as follows:

**§ 29.1505 Never-exceed speed.**

(a) The never-exceed speed, VNE, must be established so that it is—

(1) Not less than 40 knots (CAS); and

(2) Not more than the lesser of—

(i) 0.9 times the maximum forward speeds established under § 29.309; or

(ii) 0.9 times the maximum speed shown under §§ 29.251 and 29.629.

* * * * *

(c) For helicopters, a stabilized power-off VNE denoted as VNE (power-off) may be established at a speed less than VNE established pursuant to paragraph (a) of this section, if the following conditions are met:

(1) VNE (power-off) is not less than a speed midway between the power-on VNE and the speed used in meeting the requirements of—

(i) § 29.67(a)(3) for Category A helicopters;

(ii) § 29.65(a) for Category B helicopters, except multi-engine helicopters meeting the requirements of § 29.67(b); and

(iii) § 29.67(b) for multi-engine Category B helicopters meeting the requirements of § 29.67(b).

(2) VNE (power-off) is—

(i) A constant airspeed;

(ii) A constant amount less than power-on VNE; or

(iii) A constant airspeed for a portion of the altitude range for which certification is requested, and a constant amount less than power-on VNE for the remainder of the altitude range.

87. By revising § 29.1521(e) to read as follows:

**§ 29.1521 Powerplant limitations.**

* * * * *

(e) *Ambient temperature.* Ambient temperature limitations (including limitations for winterization installations if applicable) must be established as the maximum ambient atmospheric temperature at which compliance with the cooling provisions of §§ 29.1041 through 29.1049 is shown.

* * * * *

88. By adding a new § 29.1527 following § 29.1525 to read as follows:

**§ 29.1527 Maximum operating altitude.**

The maximum altitude up to which operation is allowed, as limited by flight, structural, powerplant, functional, or equipment characteristics, must be established.

89. 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) A red radial line—

(i) For rotorcraft other than helicopters, at VNE; and

(ii) For helicopters, at VNE; (power-on).

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

* * * * *

90. By deleting § 29.1581(c) and marking it "[Reserved]", and by revising §§ 29.1581 (a) and (b) and adding a new § 29.1581(d) to read as follows:

**§ 29.1581 General.**

(a) *Furnishing information.* A Rotorcraft Flight Manual must be furnished with each rotorcraft, and it must contain the following:

(1) Information required by §§ 29.1583 through 29.1589.

(2) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) *Approved information.* Each part of the manual listed in §§29.1583 through 29.1589 that is appropriate to the rotorcraft, must be furnished, verified, and approved, and must be segregated, identified, and clearly distinguished from each unapproved part of that manual.

(c) [Reserved]

(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.

91. By revising § 29.1583(b) and by adding a new § 29.1583(h) to read as follows:

**§ 29.1583 Operating limitations.**

* * * * *

(b) *Powerplant limitations.* The following information must be furnished:

(1) Limitations required by § 29.1521.

(2) Explanation of the limitations, when appropriate.

(3) Information necessary for marking the instruments required by §§ 29.1549 through 29.1553.

* * * * *

(h) *Altitude.* The altitude established under § 29.1527 and an explanation of the limiting factors must be furnished

92. By adding new §§ 29.1585 (c) and (d) to read as follows:

§ 29.1585 Operating procedures.

* * * * *

(c) For helicopters for which a $V_{NE}$ (power-off) is established under § 29.1505(c), information must be furnished to explain the $V_{NE}$ (power-off) and the procedures for reducing airspeed to not more than the $V_{NE}$ (power-off) following failure of all engines.

(d) For each rotorcraft showing compliance with § 29.1353 (c)(6)(ii) or (c)(6)(iii), the operating procedures for disconnecting the battery from its charging source must be furnished.

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## PART 91—GENERAL OPERATING AND FLIGHT RULES

93. By revising § 91.31(b) and adding a new § 91.31(e) to read as follows:

§ 91.31 Civil aircraft operating limitations and marking requirements.

* * * * *

(b) No person may operate a U.S. registered civil aircraft—

(1) For which an Airplane or Rotorcraft Flight Manual is required by § 21.5 unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual or the manual provided for in § 121.141(b); and

(2) For which an Airplane or Rotorcraft Flight Manual is not required by § 21.5, unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

* * * * *

(e) The Airplane or Rotorcraft Flight Manual, or manual material, markings and placards required by paragraph (b) of this section must contain each operating limitation prescribed for that aircraft by the Administrator, including the following:

(1) Powerplant (e.g., r.p.m., manifold pressure, gas temperature, etc.).

(2) Airspeeds (e.g., normal operating speed, flaps extended speed, etc.).

(3) Aircraft weight, center of gravity, and weight distribution, including the composition of the useful load in those combinations and ranges intended to ensure that the weight and center of gravity position will remain within approved limits (e.g., combinations and ranges of crew, oil, fuel, and baggage).

(4) Minimum flight crew.

(5) Kinds of operation.

(6) Maximum operating altitude.

(7) Maneuvering flight load factors.

(8) Rotor speed (for rotorcraft).

(9) Limiting height-speed envelope (for rotorcraft).

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

94. By revising § 121.141(b) to read as follows:

§ 121.141 Airplane or rotorcraft flight manual.

* * * * *

(b) In each transport-category aircraft, the certificate holder shall carry either the manual required by § 121.133, if it contains the information required for the applicable flight manual and this information is clearly identified as flight manual requirements, or an approved Airplane or Rotorcraft Flight Manual. If the certificate holder elects to carry the manual required by § 121.133, he may revise the operating procedures sections and modify the presentation of performance data from the applicable flight manual if the revised operating procedures and modified performance data presentation are—

(1) Approved by the Administrator; and

(2) Clearly identified as airplane or rotorcraft flight manual requirements.

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

NOTE.—The Federal Aviation Administration has determined that this document does not contain a major proposal requiring preparation of an Economic Impact Statement under Executive Order 11821, as amended by Executive Order 11949, and OMB Circular A-107.

Issued in Washington, D.C., on January 9, 1978.

LANGHORNE BOND,
*Administrator.*

[FR Doc.78-1034 Filed 1-13-78;8:45 am]

federal register

MONDAY, JANUARY 16, 1978

PART V


# DEPARTMENT OF TRANSPORTATION

## Federal Aviation Administration

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# ADVISORY CIRCULAR CHECKLIST [AND STATUS OF FEDERAL AVIATION REGULATIONS]

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

[AC 00-2MM Effective Nov. 15, 1977]

### ADVISORY CIRCULAR CHECKLIST [AND STATUS OF FEDERAL AVIATION REGULATIONS]

1. *Purpose.* This notice contains the revised checklist of current FAA advisory circulars (and the status of Federal Aviation Regulations) as of Nov. 15, 1977.

2. *Explanation.* The FAA issues advisory circulars to inform the aviation public in a systematic way of nonregulatory material of interest. Unless incorporated into a regulation by reference, the contents of an advisory circular are not binding on the public. Advisory circulars are issued in a numbered-subject system corresponding to the subject areas of the Federal Aviation Regulations (14 CFR Ch. I). This checklist is issued triannually to list all current advisory circulars and also includes a checklist showing the status of the Federal Aviation Regulations.

3. *The Circular Numbering System.*

a. *General.* The advisory circular numbers relate to the FAR subchapter titles and correspond to the Parts, and when appropriate, to the specific sections of the Federal Aviation Regulations. Circulars of a general nature bear a number corresponding to the number of the general subject (subchapter) in the FAR's. A general subject number is used *only* when a circular covers more than one Part.

b. *General subject numbers.* The general subject matter areas and related numbers are as follows:

*General Subject Number and Subject Matter*

| | |
|---|---|
| 00 | General. |
| 10 | Procedural. |
| 20 | Aircraft. |
| 60 | Airmen. |
| 70 | Airspace. |
| 90 | Air Traffic Control and General Operations. |
| 120 | Air Carrier and Commercial Operators and Helicopters. |
| 140 | Schools and Other Certified Agencies. |
| 150 | Airports. |
| 170 | Air Navigational Facilities. |
| 180 | Administrative. |
| 210 | Flight Information. |

Within the General Subject Number Areas, specific selectivity in advisory circular mail lists is available corresponding to the applicable FAR Parts. For example: under the 60 general subject area, separate mail lists for advisory circulars issued in the 61, 63, 65, or 67 series are available.

c. *Breakdown of subject numbers.* When the volume of circulars in a series warrants a subsubject breakdown, the general number is followed by a slash and a subsubject number. Material in the 150 series, Airports, is issued under the following subsubjects:

*Number and Subject*

| | |
|---|---|
| 150/1900 | Defense Readiness Program. |
| 150/4000 | Resource Management. |
| 150/5000 | Airport Planning. |
| 150/5100 | Federal-aid Airport Program. |
| 150/5150 | Surplus Airport Property Conveyance Programs. |
| 150/5190 | Airport Compliance Program. |
| 150/5200 | Airport Safety—General. |
| 150/5210 | Airport Safety Operations (Recommended Training, Standards, Manning). |
| 150/5220 | Airport Safety Equipment and Facilities. |
| 150/5230 | Airport Ground Safety System. |
| 150/5240 | Civil Airports Emergency Preparedness. |
| 150/5300 | Design, Construction, and Maintenance—General. |
| 150/5320 | Airport Design. |
| 150/5325 | Influence of Aircraft Performance on Aircraft Design. |
| 150/5335 | Runway, Taxiway, and Apron Characteristics. |
| 150/5340 | Airport Visual Aids. |
| 150/5345 | Airport Lighting Equipment. |
| 150/5360 | Airport Buildings. |
| 150/5370 | Airport Construction. |
| 150/5380 | Airport Maintenance. |
| 150/5390 | Heliports. |
| 150/5900 | Planning Grant for Airports. |

d. *Individual circular identification numbers.* Each circular has a subject number followed by a dash and a sequential number identifying the individual circular. This sequential number is not used again in the same subject series. Revised circulars have a letter A, B, C, etc., after the sequential number to show complete revisions. Changes to circulars have CH 1, CH 2, CH 3, etc., after the identification number on pages that have been changed. The date on a revised page is changed to the effective date of the change.

4. *The Advisory Circular Checklist.*

a. *General.* Each circular issued is listed numerically within its subject-number breakdown. The identification number (AC 120-1), the change number of the latest change, if any, to the right of the identification number, the title, and the effective date for each circular are shown. A brief explanation of the contents is given for each listing.

b. *Omitted numbers.* In some series, sequential numbers are missing. These numbers were assigned to advisory circulars still in preparation which will be issued later or were assigned to advisory circulars that have been canceled.

c. *Free and sales circulars.* This checklist contains advisory circulars that are for sale as well as those distributed free of charge by the Federal Aviation Administration. A list of circulars sold by the Superintendent of Documents is shown at the end of the numerical list of AC's. Please use care when ordering circulars to ensure that they are ordered from the proper source.

d. *Internal directives for sale.* A list of certain internal directives sold by the Superintendent of Documents is shown at the end of the checklist. These documents are not identified by advisory circular numbers, but have their own directive numbers.

5. *How to get circulars.*

a. When a price is listed after the description of a circular, it means that this circular is for sale by the Superintendent of Documents. When (Sub.) is included with the price, the advisory circular is available on a subscription basis only. After your subscription has been entered by the Superintendent of Documents, supplements or changes to the basic document will be provided automatically at no additional charge until the subscription expires. When no price is given, the circular is distributed free of charge by FAA.

b. Request free advisory circulars shown without an indicated price from:

U.S. Department of Transportation, Publications Section TAD 443.1, Washington, D.C. 20590.

c. Persons who want to be placed on FAA's mailing list for future circulars should write to:

U.S. Department of Transportation, Distribution Requirements Section, TAD 482.3, Washington, D.C. 20590.

NOTE: Be sure to identify the subject matter numbers and titles shown in paragraph 3b because separate mailing lists are maintained for each advisory circular subject series. Checklists and circulars issued in the General series will be distributed to every addressee on each of the subject series lists. Persons requesting more than one subject classification may receive more than one copy of related circulars and this checklist because they will be included on more than one mailing list. Persons already on the distribution list for AC's will automatically receive related circulars.

d. Order advisory circulars and internal directives with purchase price given from:

Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402;

or from any of the following Government bookstores located throughout the United States:

GPO Bookstore, Room 102A, 2121 Building, 2121 Eighth Avenue North, Birmingham, AL 35203.

GPO Bookstore, Federal Building, Room 1015, 300 North Los Angeles Street, Los Angeles, CA 90012.

GPO Bookstore, Federal Building, Room 1023, 450 Golden Gate Avenue, San Francisco, CA 94102.

GPO Bookstore, Federal Building, U.S. Courthouse, Room 1421, 1961 Stout Street, Denver, CO 80202.

GPO Bookstore, P.O. Box 713, Pueblo, CO 81002.

GPO Bookstore, Federal Building, Room 158, 400 West Bay Street, Jacksonville, FLA 32202.

GPO Bookstore, Room 100, Federal Building, 275 Peachtree Street NE., Atlanta, GA 30303.

GPO Bookstore, Everett McKinley Dirksen Building, Room 1463, 14th Floor, 219 South Dearborn Street, Chicago, IL 60604.

GPO Bookstore, Room G25, John F. Kennedy Federal Building, Sudbury Street, Boston, MA 02203.

GPO Bookstore, Federal Office Building, Room 229, 231 W. Lafayette Blvd., Detroit, MI 48226.

GPO Bookstore, Federal Building, Room 144, 601 East 12th Street, Kansas City, MO 64106.

GPO Bookstore, Room 1356, 26 Federal Plaza, New York, NY 10007.

GPO Bookstore, Room 207, Federal Office Bldg., 200 N. High St., Columbus, OH 43215.

GPO Bookstore, Federal Office Building, Room 171, 1240 East Ninth Street, Cleveland, OH 44199.

GPO Bookstore, Federal Office Bldg., Room 1214, 600 Arch St, Philadelphia, PA 19106.

GPO Bookstore, 45 College Center, 9319 Gulf Freeway, Houston, TX 77017.
GPO Bookstore, Room 1C46, Federal Building, U.S. Courthouse, 1100 Commerce Street, Dallas, TX 75202.
GPO Bookstore, Federal Building, Room 190, 915 Second Ave., Seattle, WA 98174.
GPO Bookstore, Federal Building, Room 190, 517 E. Wisconsin Avenue, Milwaukee, WI 53202.
GPO Bookstore, 710 North Capitol Street NW., Washington, D.C. 20402.

*Special Notice*

*Orders for subscription items can no longer be accepted by the bookstores. These orders must be placed directly with the Superintendent of Documents, Washington, D.C. 20402.*

Send check or money order with your order to the Superintendent of Documents. Make the check or money order payable to the Superintendent of Documents in the amounts indicated in the list. Orders for mailing to foreign countries should include an additional 25 percent of the total price to cover handling. No c.o.d. orders are accepted.

6. *Reproduction of Advisory Circulars.* Advisory circulars may be reproduced in their entirety or in part without permission from the Federal Aviation Administration.

7. *Cancellations.* The following advisory circulars are canceled:

AC 00-2 LL Advisory Circular Checklist, 7-15-77. Canceled by AC 00-2MM Advisory Circular Checklist, 11-15-77.
AC 00-44G Status of Federal Aviation Regulations, 5-1-77. Canceled by AC 00-44H Status of Federal Aviation Regulations, 9-30-77.
AC 20-6BB U.S. Civil Aircraft Register, Dec. 1976. Canceled by AC 20-6CC U.S. Civil Aircraft Register, July 1977.
AC 20-7N General Aviation Inspection Aids, Aug. 1976. Canceled by AC 20-7P General Aviation Inspection Aids, Aug. 1977.
AC 20-34A Prevention of Retractable Landing Gear Failures, 4-21-69. Canceled by
AC 20-348 Prevention of Retractable Landing Gear Failures, 7-13-77.
AC 20-51 Procedures for Obtaining FAA Approval of Major Alterations to Type Certificated Products, 4-12-67. Canceled.
AC 21.25-1 Use of Restricted Category Airplanes for Glider Towing, 4-20-65. Canceled.
AC 21.303-2 Availability of Listing, "Parts Manufacturer Approvals"—1975, 3-31-76. Canceled by AC 21.303-2A Availability of Listing, "Parts Manufacturer Approvals"—1977, 10-1-77.
AC 43-9 Maintenance Records: General Aviation Aircraft, 2-19-75. Canceled by AC 43-9A Maintenance Records: General Aviation Aircraft, 9-9-77.
AC 61-1E Aircraft Type Ratings, 3-22-76. Canceled by AC 61-86 Pilot Type Rating Certificate Information, 6-30-77.
AC 61-2A Private Pilot (Airplane) Flight Training Guide, 9-1-64. Canceled.
AC 61-74 Flight Instructor—Rotorcraft—Helicopter—Written Test Guide, 5-8-74. Canceled by AC 61-74A Flight Instructor — Rotorcraft-Helicopter — Written Test Guide, 5-27-77.
AC 65-13B FAA Inspection Authorization Directory, 11-26-76. Canceled by AC 65-13C FAA Inspection Authorization Directory, 10-19-77.
AC 70-2A Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation and Deactivation of Airports, 10-26-76. Canceled by AC 70-2B Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation, and Deactivation of Airports, 9-23-77.
AC 90-12B Severe Weather Avoidance, 6-18-76. Canceled.
AC 90-43C Operations Reservations for High-Density Traffic Airports, 11-14-71. Canceled by AC 90-43D Operations Reservations for High-Density Traffic Airports, 7-20-77.
AC 90-54A Cruise Clearances, 11-27-73. Canceled.
AC 91-39 Recommended Noise Abatement Takeoff and Departure Procedure for Civil Turbojet Powered Airplanes, 1-18-74. Canceled.
AC 91-40 Terminal Control Area (TCA) Radar Outage, 1-17-74. Canceled.
AC 97-1 Runway Visual Range (RVR), 11-4-76. Canceled by AC 97-1A Runway Visual Range (RVR), 9-28-77.
AC 103-2 Information Guide for Air Carrier Handling of Radioactive Materials, 7-23-70. Canceled.
AC 140-1H Consilidated Listing of FAA Certificated Repair Stations, 2-9-76. Canceled by AC 140-1J Consolidated Listing of FAA Certificated Repair Stations, 7-27-77.
AC 150/5000-3C Address List for Regional Airports Divisions and Airport District Offices, 12-9-75. Canceled by AC 150/5000-3D Address List for Regional Airports Divisions and Airports District/Field Offices, 10-18-77.
AC 150/5050-2 Compatible Land Use Planning in the Vicinity of Airports, 4-13-67. Canceled.
AC 150/5190-3A Model Airport Hazard Zoning Ordinance, 9-19-72. Canceled by AC 150/5190-4 A Model Zoning Ordinance to Limit Height of Objects Around Airports, 8-23-77.
AC 150/5345-12A Specification for L-801 Beacon, 5-12-67. Canceled by AC 150/5345-12B Specification for L-801 Beacons, 9-8-77.
AC 150/5360-4 Guidelines for Federal Inspection Services Facilities at International Airports of Entry and Landing Rights Airports, 5-20-76. Canceled by AC 150/5360-4A Announcement of Availability—Guidelines for Federal Inspection Services Facilities at International Airports of Entry and at Landing Rights Airports, 10-7-77.
AC 150/5390-1A Heliport Design Guide, 11-5-69. Canceled by AC 150/5390-1B Heliport Design Guide, 9-22-77.
AC 183.29-1J Designated Engineering Representatives, 7-1-76. Canceled by AC 183.29-1K Designated Engineering Representatives, 7-1-77.

8. *Additions.* The following advisory circulars are added to the list.

AC 00-2MM Advisory Circular Checklist, 11-15-77.
AC 00-44H Status of Federal Aviation Regulations, 9-30-77.
AC 00-52 Ozone Irritation During High Altitude Flight, 7-21-77.
AC 20-6CC U.S. Civil Aircraft Register, July 1977.
AC 20-7P General Aviation Inspection Aids, August 1977.
Supplement 1 September 1977.
Supplement 2 October 1977.
AC 20-34B Prevention of Retractable Landing Gear Failures, 7-13-77.
AC 20-100 General Guidelines for Measuring Fire-Extinguishing Agent Concentrations in Powerplant Compartments, 9-21-77.
AC 20-101 Omega and Omega/VLF Navigation System Installation Approval in the Conterminous United States and Alaska, 10-14-77.
AC 21.303-2A Availability of Listing, "Parts Manufacturer Approvals"—1977, 10-1-77.
AC 43-9A Maintenance Records: General Aviation Aircraft, 9-9-77.
AC 43-15 Recommended Guidelines for Instrument Shops, 8-15-77.
AC 61-74A Flight Instructor Rotorcraft Helicopter Written Test Guide, 5-27-77.
AC 61-86 Pilot Type Rating Certificate Information, 6-30-77.
AC 65-13C FAA Inspection Authorization Directory, 10-19-77.
AC 70-2B Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation and Deactivation of Airports, 9-23-77.
AC 90-43D Operations Reservations for High-Density Traffic Airports, 7-20-77.
AC 91-23A Pilots Weight and Balance Handbook, 6-9-77.
AC 91-48 Acrobatics—Precision Flying With a Purpose, 6-29-77.
AC 91-49 General Aviation Procedures for Flight in North Atlantic Minimum Navigation Performance Specifications Airspace, 8-23-77.
AC 91-50 Importance of Transponder Operation and Altitude Reporting, 8-24-77.
AC 91-51 Airplane Deice and Anti-Ice Systems, 9-15-77.
AC 97-1A Runway Visual Range (RVR), 9-28-77.
AC 120-33 Operational Approval of Airborne Long-Range Navigation Systems for Flight Within the North Atlantic Minimum Navigation Performance Specifications Airspace, 6-24-7.
AC 120-34 Air Transportation of Mental Patients, 6-29-77.
AC 121-24 Passenger Safety Information Briefing and Briefing Cards, 6-23-77.
AC 121-25 Additional Weather Information: Domestic and Flag Air Carriers, 9-16-77.
AC 133-1 Rotorcraft External-Load Operations in Accordance with Federal Aviation Regulations Part 133, 7-15-77.
AC 140-1J Consolidated Listing of FAA Certificated Repair Stations, 7-22-77.
AC 150/5000-3D Address List for Regional Airports Divisions and Airports District/Field Offices, 10-18-77.
AC 150/5190-4 A Model Zoning Ordinance to Limit Height of Objects Around Airports, 8-23-77.
AC 150/5325-4 CH 12 Runway Length Requirements for Airport Design, 7-27-77.
AC 150/5340-27 Air-to-Ground Radio Control of Airport Lighting Systems, 8-10-77.
AC 150/5345-1E CH 2 Approved Airport Lighting Equipment, 8-8-77.
AC 150/5345-12B Specification for L-801 Beacons, 8-8-77.
AC 150/5360-4A Announcement of Availability—"Guidelines for Federal Inspection Services Facilities at International Airports of Entry and at Landing Rights Airports," 10-7-77.
AC 150/5390-1B Heliport Design Guide, 8-22-77.
AC 183.29-1K Designated Engineering Representatives, 7-1-77.
AC 210-5 Military Flying Activities, 9-23-77.

## ADVISORY CIRCULAR CHECKLIST

### Notice

Superintendent of Documents stock numbers have been included to aid Superintendent of Documents personnel in processing orders.

Please use them when ordering—along with the title and FAA number. To avoid unnecessary delays, do not order single-sales material and subscription-sales material on the same order form, as orders are separated for processing by different departments when they arrive at Superintendent of Documents. Be sure your name and and address appears on each list.

NOTICE

Prices shown are those in effect as of Nov. 15, 1977. Prices are subject to change swithout notice and the price that will be charged on your order will be those in effect as of the date your order is processed.

### General

SUBJECT NO. 00

**00–1 The Advisory Circular System (12–1–62).**

Describes the FAA Advisory Circular System.

**OO–2MM Advisory Circular Checklist (11–15–77).**

Transmits the revised checklist of current FAA advisory circulars [and the status of the Federal Aviation Regulations] as of 11–15–77.

**00–6A Aviation Weather (3–3–75).**

Provides an up-to-date and expanded text for pilots and other flight operations personnel whose interest in meteorology is primarily in its application to flying. ($4.55 Supt. Docs.) SN 050–007–00283–1.

**00–7A State and Regional Disaster Airlift (SARDA) Planning (6–3–74).**

Provides guidance for the development and implementation of State and Regional Disaster Airlift plans governing the use of general aviation aircraft during national emergencies and natural disasters.

**00–7A CH 1 Transmits revised material consisting of procedural changes for insertion in the basic.**

**00–21 Shoulder Harness (10–5–66).**

Provides information concerning the installation and use of shoulder harnesses by pilots in general aviation aircraft.

**00–24 Thunderstorms (6–12–68).**

Contains information concerning flights in or near thunderstorms.

**00–25 Forming and Operating a Flying Club (3–24–69).**

Provides preliminary information that will assist anyone or any group of people interested in forming and operating a flying club ($0.75 Supt. Docs.) SN 050–007–00065–1.

**00–26 Definitions of "U.S. National Aviation Standards" (1–22–69).**

Informs the aviation community of the approval by the FAA Administrator of a definition of U.S. National Aviation Standards, the need for such standards, and their relationship to the Federal Aviation Regulations.

**00–28 Communications Interference Caused by Sticking Microphone Buttons (8–6–69).**

Alerts the industry of communications interference from undesired radiofrequency transmissions.

**00–30 Rules of Thumb for Avoiding or Minimizing Encounters with Clear Air Turbulence (3–5–70).**

Brings to the attention of pilots and other interested personnel, the "Rule of Thumb" for avoiding or minimizing encounters with clear air turbulence (CAT).

**00–31 U.S. National Aviation Standard for the VORTAC System (6–10–70).**

Informs the aviation community of the establishment and content of the U.S. National Aviation Standard for the VORTAC (VOR–TACAN–DME) System.

**00–32 Civil Air Patrol and State and Regional Defense Airlift Relationships (7–2–70).**

Advises interested persons of the Memorandum of Understanding between CAP and FAA, and provides additional guidance to further improve the use of non-air carrier aircraft in time of national emergency.

**00–33A Nickel-Cadmium Battery Operational, Maintenance, and Overhaul Practices (2–14–73).**

Provides guidelines for more reliable nickel-cadmium battery operation through proper operational and maintenance practices, and has been reissued to include reconditioning information.

**00–34A Aircraft Ground Handling and Servicing (7–29–74).**

Contains information and guidance for the servicing and ground handling of aircraft.

**00–41A FAA Quality Control System Certification Program (11–3–75).**

Describes the FAA Quality Control System Certification Program and the mechanics of implementation. It is intended for guidance and information only.

**00–44H Status of the Federal Aviation Regulations (9–30–77).**

Summarizes the current status of the conversion program, lists FAR prices, and provides ordering instructions for purchasing the regulations.

**00–45A Aviation Weather Services (4–28–77).**

Supplements AC 00–6A, Aviation Weather, in that it explains the weather service in general and the use and interpretation of reports, forecasts, weather maps, and prognostic charts in detail. Is an excellent source of study for pilot certification examinations. ($3.00 Supt. Docs.) SN 050–007–00392–7.

**00–46A Aviation Safety Reporting Program (3–31–76).**

Advises that the FAA will modify the Aviation Safety Reporting Program, effective April 15, 1976, by utilizing NASA as a third party to receive and analyze the aviation safety reports. This study invites pilots, controllers, and other users of the airspace or any other person to report to NASA actual or potential discrepancies and dificiencies involving the safety of aircraft operations.

**00–50 Low Level Wind Shear (4–8–76).**

Provides guidance for recognizing the meteorological situations that produce the phenomenon widely known as low level wind shear.

**00–52 Ozone Irritation During High Altitude Flight (7–21–77).**

Defines ozone irritation, discusses its causes and symptoms, and describes a means of dealing with the problem should it occur in flight.

### Procedural

SUBJECT NO. 10

**11–1A Airspace Rule-Making Proposals and Changes to Air Traffic Control Procedures (12–21–72).**

Emphasizes the need for the early submission of proposal involving airspace rule-making activity or changes to existing procedures for the control of air traffic.

**11–2 Notice of Proposed Rulemaking Distribution System (12–17–75).**

Provides the public with information relative to participation in the FAA rulemaking process and explains the availability of the Notices.

### Aircraft

SUBJECT NO. 20

**20–3C Status and Availability of Military Handbooks and ANC Bulletins for Aircraft (6–1–73).**

Announces the status and availability of Military Handbooks and ANC Bulletins prepared jointly with FAA, Navy and Air Force.

**20–5D Plane Sense (2–11–76).**

Provides general aviation information for the private aircraft owner and outlines requirements of owning and operating a personal type airplane.

**AC 20–6CC U.S. Civil Aircraft Register (3-Vol. set) (July 1977).**

Lists all active U.S. civil aircraft by registration number. ($26.00 Supt. Docs.) SN 050–007–00381–1.

**20–7P General Aviation Inspection Aids, Summary (Aug. 1977).**

Provides the aviation community with a uniform means for interchanging service experience that may improve the durability and safety of aeronautical products. Of value to mechanics, operators of repair stations, and others engaged in the inspection, maintenance, and operation of aircraft general. ($9.00; $11.25 foreign—Sub. Supt. Docs.) SN 050–011–90058–6.

**20–7P Supplement 1 Sept. 1977.**

**20–7P Supplement 2 Oct. 1977.**

**20–9 Personal Aircraft Inspection Handbook (12–2–64).**

(Out of print. Being revised.)

Provides a general guide, in simple, nontechnical language, for the inspection of aircraft. Reprinted 1972. ($1.90 Supt. Docs.) SN 050–011–00001–1.

**20–17B Surplus Aircraft of the Armed Forces (10–11–72).**

Sets forth the method of obtaining copies of Federal Aviation Regulations which might be required for certification of surplus military aircraft.

**20–18A Qualification Testing of Turbojet Engine Thrust Reversers (3–16–66).**

Discusses the requirements for the qualification of thrust reversers and sets forth an acceptable means of compliance with the tests prescribed in Federal Aviation Regulations, Part 33, when run under nonstandard ambient air conditions.

**20–23D Interchange of Service Experience—Mechanical Difficulties (2–12–71).**

Provides information on the voluntary exchange service experience data used in improving durability and safety of aeronautical products.

**20–24A Qualification of Fuels, Lubricants, and Additives (4–1–67).**

Establishes procedures for the approval of the use of subject materials in certificated aircraft.

**20–27B Certification and Operation of Amateur-Built Aircraft (4–20–72).**

Provides information and guidance concerning certification and operation of amateur-built aircraft, including gliders, free balloons, helicopters, and gyroplanes, and sets forth an acceptable means, not the sole means, of compliance with FAR Part 21 and FAR Part 91.

**20–28A Nationally Advertised Construction Kits, Amateur Built Aircraft (12–29–72).**

Advises persons contemplating the use of nationally advertised kits for the construction of an aircraft, that certain kits when used could render the aircraft ineligible for the issuance of an experimental certificate as an amateur-built aircraft.

**20–29B Use of Aircraft Fuel Anti-icing additives (1–18–72).**

Provides information on the use of anti-icing additives PFA–55MB and Mil–I–27686 as an acceptable means of compliance with the FARs that require assurance of continuous fuel flow under conditions where ice may occur in turbine aircraft fuel systems.

**20–30A Airplane Position Lights and Supplementary Lights (4–18–68).**

Provides an acceptable means for complying with the position light requirements for airplane airworthiness and acceptable criteria for the installation of supplementary lights on airplanes.

**20–32B Carbon Monoxide (CO) Contamination in Aircraft—Detection and Prevention (11–24–72).**

Provides information on the potential dangers of carbon monoxide contamination from faulty engine exhaust systems or cabin heaters of the exhaust gas heat exchanger type.

**20–33B Technical Information Regarding Civil Aeronautics Manuals 1, 3, 4a, 4b, 5, 6, 7, 8, 9, 13 and 14 (5–1–75).**

Advises the public that policy information contained in the subject Civil Aeronautics Manuals may be used in conjunction with specific sections of the Federal Aviation Regulations.

**20–34B Prevention of Retractable Landing Gear Failures (7–13–77).**

Provides information and suggested procedures to minimize landing accidents involving aircraft having retractable landing gear.

**20–35B Tie-Down Sense (4–19–71).**

Provides information of general use on aircraft tie-down techniques and procedures.

**20–36F Index of Materials, Parts, and Appliances Certified Under the Technical Standard Order System—July 1, 1976 (9–9–76).**

Lists the materials, parts, and appliances for which the Administrator has received statements of conformance under the Technical Standard Order system as of July 1, 1976. Such products are deemed to have met the requirements for FAA approval as provided in Part 37 of the Federal Aviation Regulations.

**20–37B Aircraft Metal Propeller Blade Failure (9–12–74).**

Provides information and suggested procedures to increase service life and to minimize blade failures of metal propellers.

**20–38A Measurement of Cabin Interior Emergency Illumination in Transport Airplanes (2–8–66).**

Outlines acceptable methods, but not the only methods, for measuring the cabin interior emergency illumination on transport airplanes, and provides information as to suitable measuring instruments.

**20–40 Placards for Battery-Excited Alternators Installed in Light Aircraft (8–11–65).**

Sets forth an acceptable means of complying with placarding rules in Federal Aviation Regulations 23 and 27 with respect to battery-excited alternator installations.

**20–41A Substitute Technical Standard Order (TSO) Aircraft Equipment (4–5–77).**

Sets forth an acceptable means for complying with rules governing aircraft equipment installations in cases involving the substitution of technical standard order or equipment for functionally similar TSO approved equipment.

**20–42 Hand Fire Extinguishers in Transport Category Airplanes and Rotorcraft (9–1–65).**

Sets forth acceptable means (but not the sole means) of compliance with certain hand fire extinguisher regulations in FAR 25 and FAR 29, and provides related general information.

**AC 20–43C Aircraft Fuel Control (10–20–76).**

Alerts the aviation community to the potential hazards of inadvertent mixing or contamination of turbine and piston fuels, and provides recommended fuel control and servicing procedures.

**20–44 Glass Fiber Fabric for Aircraft Covering (9–3–65).**

Provides a means, but not the sole means, for acceptance of glass fiber fabric for external covering of aircraft structure.

**20–45 Safetying of Turnbuckles on Civil Aircraft (9–17–65).**

Provides information on turnbuckle safetying methods that have been found acceptable by the FAA during past aircraft type certification programs.

**20–46 Suggested Equipment for Gliders Operating Under IFR (9–23–65.)**

Provides guidance to glider operators on how to equip their gliders for operation under instrument flight rules (IFR), including flight through clouds.

**20–47 Exterior Colored Band Around Exits on Transport Airplanes (2–8–66).**

Sets forth an acceptable means, but not the only means, of complying with the requirement for a 2-inch colored band outlining exits required to be openable from the outside on transport airplanes.

**20–48 Practice Guide for Decontaminating Aircraft (5–5–66).**

The title is self-explanatory.

**20–52 Maintenance Inspection Notes for Douglas DC–6/7 Series Aircraft (8–24–67). (Consolidated Reprint—January 1974, includes Change 1.)**

Describes maintenance inspection notes which can be used for the maintenance support of certain structural parts of DC–6 6/7 series aircraft.

**20–53 Protection of Aircraft Fuel System Against Lightning (10–6–67).**

Sets forth acceptable means, not the sole means, by which compliance may be shown with fuel system lightning protection airworthiness regulations.

**20–54 Hazards of Radium-Activated Luminous Compounds Used on Aircraft Instruments (10–24–67).**

Provides information concerning health hazards associated with the repair and maintenance of instruments containing luminous markings activated with radium-226 or radium-228 (mesothorium).

**20–55 Turbine Engine Overhaul Standard Practices Manual—Maintenance of Fluorescent Penetrant Inspection Equipment (1–22–68).**

Advises operators of the necessity for periodic checking of black light lamps and filters used during fluorescent penetrant inspection of engine parts.

**20–56A Marking of TSO–C72b Individual Flotation Devices (4–1–75).**

Outlines acceptable methods for marking individual flotation devices which also serve as seat cushions.

**20–57A Automatic Landing Systems (ALS) (1–12–71).**

Sets forth an acceptable means of compliance, but not the only means, for the installation approval of automatic landing systems in transport category aircraft which may be used initially in Category II operations. Approval of these aircraft for use under such conditions will permit the accumulation of data for systems which may be approved for Category IIIa in the future.

**20–59 Maintenance Inspection Notes for Convair 240, 340/440, 240T, and 340T Series Aircraft (2–19–68).**

Describes maintenance inspection notes which can be used for the maintenance support of certain structural parts of Convair 240, 340/440, 240T, and 340T series aircraft.

**20–59 CH 1 (8–24–72).**

Provides additional material for Convair Models 240 and 600/240D; Models 340/440 and 640/340D/440D series aircraft Maintenance inspection programs.

**20–60 Accessibility to Excess Emergency Exits (7–18–68).**

Sets forth acceptable means of compliance with the "readily accessible" provisions in the Federal Aviation Regulations dealing with excess emergency exits.

**20–62C Eligibility, Quality, and Identification of Approved Aeronautical Replacement Parts (8–26–76).**

Provides information relative to the determination of the eligibility of aeronautical parts and materials for installation on certificated aircraft.

**20–63 Airborne Automatic Direction Finder Installations (Low and Medium Frequency) (7–7–69).**

Sets forth one means, but not the only means, of demonstrating compliance with the airworthiness rules governing the functioning of airborne automatic direction finders. It does not pertain to installations previously approved.

**20–64 Maintenance Inspection Notes for Lockheed L–188 Series Aircraft (8–1–69).**

Describes maintenance inspection notes which can be used for the maintenance support of certain structural parts of Lockheed L–188 series aircraft.

**20–64 CH 1 (10–26–73).**

**20–65 U.S. Airworthiness Certificates and Authorizations for Operation of Domestic and Foreign Aircraft (8–11–69).**

Provides general information and guidance concerning issuance of airworthiness certificates for U.S. registered aircraft, and issuance of special flight authorizations for operation in the United States of foreign aircraft not having standard airworthiness certificates issued by the country of registry.

**20–66 Vibration Evaluation of Aircraft Propellers (1–29–70).**

Outlines acceptable means, but not the sole means, for showing compliance with the requirements of the FARs concerning propeller vibration.

**20–67A Airborne VHF Communication System Installations (10–17–72).**

Sets forth one means, but not the only means of demonstrating compliance with the airworthiness rules governing the functioning of airborne VHF communication systems.

**20–68A Recommended Radiation Safety Precautions for Airborne Weather Radar (4–11–75).**

Sets forth recommended radiation safety precautions for ground operation of airborne weather radar.

**20–69 Conspicuity of Aircraft Instrument Malfunction Indicators (5–14–70).**

Provides design guidance information on methods of improving conspicuity of malfunction indication devices.

**20–71 Dual Locking Devices on Fasteners (12–8–70).**

Provides guidance and acceptable means, not the sole means, by which compliance may be shown with the requirements for dual locking devices on removable fasteners installed in rotorcraft and transport category airplanes.

**20–73 Aircraft Ice Protection (4–21–71).**

Provides information relating to the substantiation of ice protection systems on aircraft.

**20–74 Aircraft Position and Anticollision Light Measurements (7–29–71).**

Contains useful information concerning measurements for intensity, covering, and color of aircraft position and anticollision lights.

**20–76 Maintenance Inspection Notes for Boeing B–707/720 Series Aircraft (10–21–71).**

Provides maintenance inspection notes which can be used for the maintenance support program for certain structural parts of the B–707/720 series aircraft.

**20–77 Use of Manufacturers' Maintenance Manuals (3–22–72).**

Informs owners and operators about the usefulness of manufacturers' maining, and maintaining aircraft, engines, tenance manuals for servicing, repair- and propellers.

**20–78 Maintenance Inspection Notes for McDonnell Douglas DC–8 Series Aircraft (7–11–72).**

Provides maintenance inspection notes which can be used for the maintenance support program for certain structural parts of the DC–8 series aircraft.

**20–81 Accidental or Unauthorized Activation of Emergency Locator Transmitters (ELT) (10–10–72).**

Alerts the general aviation community to the harmful effects of accidental or unauthorized activation of emergency locator transmitters.

**20–82 Maintenance Inspection Notes for Fairchild Hiller F–27/FH–227 Series Aircraft (12–5–72).**

Provides maintenance inspection notes which can be used for the maintenance support program for certain structural parts of Fairchild Hiller F–27/FH–227 series aircraft.

**20–82 CH 1 (7–12–73).**

Provides additional material for subject advisory circular.

**20–83 Maintenance Inspection Notes for Boeing B–737 Series Aircraft (1–17–73).**

Provides maintenance inspection notes which can be used for the maintenance support program for certain structural parts of the B–737 series aircraft.

**20–83 CH 1 (8–8–74).**

Provides updating of material for the B–737 series aircraft maintenance inspection program. Inspection of selected areas of the wing, fuselage, empennage and landing gear of B–737 series aircraft are presented supplementing information currently in AC 20–83.

**20–83 CH 2 (1–31–75).**

**20–84 Maintenance Inspection Notes for Boeing B–727 Series Aircraft (1–22–73).**

Provides inspection notes which can be used for the maintenance support program for certain structural parts of the B–727 series aircraft.

**20–84 CH 1 (8–8–74).**

Updates material for the B–727 series aircraft maintenance inspection program. Inspection of selected areas of the wing, fuselage, empennage and landing gear of the B–727 series aircraft are presented supplementing information currently available in AC 20–84.

**20–84 CH 2 (1–31–75).**

**20–85 Emergency Locator Transmitters and Receivers (3–16–73).**

Provides information concerning the design, installation, and utilization of emergency locator transmitters.

**20–86 Aviation Education through Building an Airplane (5–11–73).**

Provides information to high schools about the available assistance, resources, methods, and opportunities for attaining basic educational goals by building an airplane.

**20–87 Airborne Homing and Alerting Equipment for use with Emergency Locator Transmitters (5–7–73).**

Sets forth the availability of recommended basic characteristics for airborne homing and alerting equipment for use with emergency locator transmitters (ELT).

**20–88 Guidelines on the Marking of Power-Plant Instruments (12–11–73).**

Provides guidelines on the marking of aircraft powerplant instruments.

**20–89 Communication Interference Caused by Unintentional Radio Transmissions (3–22–74).**

Alerts the aviation community to the potential hazards created by unintentional radio transmissions from airborne, mobile, and ground based radio transmitters and gives guidance on alleviating ensuing hazards.

**20–90B Address List for Engineering and Manufacturing District Offices (12–3–76).**

Transmits the address list for all Engineering and Manufacturing District Offices.

**20–91 Lithium Batteries Used in Emergency Locator Transmitters (4–11–75).**

Warns of potential hazards associated with accidental release of sulfur-dioxide gas from lithium-sulfur batteries.

**20–92 Anti-Icing Additives to Reduce Icing Problems in Aviation Gasoline (1–12–76).**

Title is self explanatory.

**20–93 Flutter Due to Ice or Foreign Substance on or in Aircraft Control Surfaces (1–29–76).**

Provides information concerning the potential hazard associated with aircraft control surface flutter caused by imbalance.

**20–94 Digital Clock Installation in Aircraft (3–4–76).**

Provides guidelines for operating and installing digital clocks in aircraft.

**20–95 Fatigue Evaluation of Rotorcraft Structure (5–18–76).**

Sets forth acceptable means, not the only means, of compliance with the provisions of FAR sections 27.571 and 29.571 dealing with the fatigue evaluation of rotorcraft structure.

**20–96 Surplus Military Aircraft—A Briefing for Prospective Buyers (12–2–76).**

Provides many answers to questions regarding the purchasing of surplus military aircraft (type certification, is the aircraft flyable, is it for spare parts, scrap?).

**20–97 High-Speed Tire Maintenance and Operational Practices (1–28–77).**

Provides information on the causes of aircraft tire failures and methods of increasing tire reliability.

**20–98 Auxiliary Two-Way Airborne Radio System Installations (5–23–77).**

Provides guidance concerning installation and operation of two-way radio communication systems which are not used for controlling an aircraft in flight (i.e., mobile telephone, amateur radio, etc.).

**20–99 Antiskid and Associated Systems (5–27–77).**

Provides an acceptable means, but not the only means, of complying with the requirement that antiskid and associated systems must be designed so that no probable malfunction will result in a hazardous loss of braking or directional control of an airplane.

**20–100 General Guidelines for Measuring Fire-Extinguishing Agent Concentrations in Powerplant Compartments (9–21–77).**

Describes the installation and use of a model GA–2A fire extinguisher agent concentration recorder in determining the distribution and concentration of fire-extinguishing agents when discharged in an aircraft powerplant compartment.

**20–101 Omega and Omega/VLF Navigation System Installation Approval in the Conterminous U.S. and Alaska (10–14–77).**

Presents criteria and an acceptable means, but not the sole means, of compliance for the installation approval of Omega and Omega/VLF Navigation Airborne Equipment as a means of VFR/IFR RNAV en route navigation within the conterminous U.S. and Alaska.

**21–1B Production Certificates (5–10–76).**

Provides information concerning Subpart G of Federal Aviation Regulations (FAR) Part 21, and sets forth acceptable means of compliance with its requirements.

**21–2C Export Airworthiness Approval Procedures (5–7–76).**

This advisory circular provides general information and guidance concerning issuance of export approvals under Federal Aviation Regulations (FAR) Part 21, Subpart L.

**21–3 Basic Glider Criteria Handbook (1962).**

Provides individual glider designers, the glider industry, and glider operating organizations with guidance material that augments the glider airworthiness certification requirements of the Federal Aviation Regulations. Reprinted 1973. ($2.05 Supt. Docs.) SN 050–011–00004–6.

**21–4B Special Flight Permits for Operation of Overweight Aircraft (7–30–69).**

Furnishes guidance concerning special flight permits necessary to operate an aircraft in excess of its usual maximum certificated takeoff weight.

**21–5D Summary of Supplemental Type Certificates (Announcement of Availability) (4–7–76).**

Announces the availability to the public of the new Summary of Supplemental Type Certificates (SSTC), dated January 1976. (See back of this checklist under "Internal Directives" for further information.)

**21–6 Production Under Type Certificate Only (5–26–67).**

Provides information concerning Subpart F of FAR Part 21, and sets forth examples, when necessary, of acceptable means of compliance with its requirements.

**21–7A Certification and Approval of Import Products (11–24–69).**

Provides guidance and information relative to U.S. certification and approval of import aircraft, aircraft engines and propellers that are manufactured in a foreign country with which the United States has an agreement for the acceptance of those products for export and import.

**21–8 Aircraft Airworthiness; Restricted Category: Certification of Aircraft With Uncertificated or Altered Engines or Propellers (5–21–69).**

Sets forth acceptable means of substantiating that uncertificated or altered engines and propellers have no unsafe features for type certification of aircraft in the restricted category.

**21–9 Manufacturers Reporting Failures, Malfunctions, or Defects (12–30–70).**

Provides information to assist manufacturers of aeronautical products (aircraft, aircraft engines, propellers, appliances, and parts) in notifying the Federal Aviation Administration of certain failures, malfunctions, or defects, resulting from design or quality control problems, in the products which they manufacture.

**21–10 Flight Recorder Underwater Locating Device (5–20–71).**

Provides one acceptable means (not the only means) of showing compliance with the underwater locating device requirements of FAR 25.1459 and FAR 121.343.

**21–11 Quality Assurance Systems Analysis Review (QASAR) Program Manufacturers/Suppliers (5–26–72).**

Explains the objectives and concept of the FAA's subject program.

**21–12 Application for U.S. Airworthiness Certificate, FAA Form 8130–6 (OMB 04–R0058) (1–17–73).**

Provides instructions on the preparation and submittal of subject form.

**21–13 Standard Airworthiness Certification of Surplus Military Aircraft and Aircraft Built from Spare and Surplus Parts (4–5–73).**

Provides guidance and instructions on establishing eligibility and submitting application for civil airworthiness certification of surplus military aircraft and

aircraft assembled from spare and surplus parts, under FAR 21.183(d) when an FAA Type Certificate has been issued under FAR 21.21 or FAR 21.27.

**21–14 The Role of Simulation in the Aircraft Certification Process (6–12–75).**

Informs the aviation industry that the FAA intends to conduct an exploratory program to determine the degree to which simulation can support the aircraft certification process.

**21–15 New Issuance System for "Aircraft Type Certificate Data Sheets and Specifications" and "Aircraft Engine and Propeller Type Certificate Data Sheets and Specifications" (4–5–77).**

Provides information concerning a change in the issuance system for the subject Type Certificates and Data Sheets.

**21.303–1A Certification Procedures for Products and Parts (8–10–72).**

Provides information concerning section 21.303 of Federal Aviation Regulations, Part 21, and to set forth examples, as necessary, of acceptable means of compliance with its requirements.

**21.303–2A Availability of Listing, "Parts Manufacturer Approvals"—1977 (10–1–77.).**

Announces the availability of the parts listing from the Superintendent of Documents at a price of $8.50. Stock No. 050–007–00401–0.

**25–2 Extrapolation of Takeoff and Landing Distance Data Over a Range of Altitude for Turbine-Powered Transport Aircraft (7–9–64).**

Sets forth acceptable means by which compliance may be shown with the requirements in CAR 4b and SR–422B.

**25–4 Inertial Navigation Systems (INS) (2–18–66).**

Sets forth an acceptable means for complying with rules governing the installation of inertial navigation systems in transport category aircraft.

**25–5 Installation Approval on Transport Category Airplanes of Cargo Unit Load Devices Approved as Meeting the Criteria in NAS 3610 (6–3–70).**

Sets forth an acceptable means, but not the sole means, of complying with the requirements of the Federal Aviation Regulations (FAR's) applicable to the installation on transport category airplanes of cargo unit load devices approved as meeting the criteria in NAS 3610.

**25–6 Ground Proximity Warning Systems (GPWS) (12–31–74).**

Outlines acceptable ground proximity warning system performance. System performance, other than that described, may also be acceptable when adequately substantiated.

**25.253–1A High-Speed Characteristics (12–27–76).**

Sets forth an acceptable means, but not the only means, by which compliance may be shown with FAR 25.253 during certification flight tests.

**25.981–1A Guidelines for Substantiating Compliance With the Fuel Tank Temperature Requirements (1–20–71).**

Sets forth some general guidelines for substantiating compliance with fuel tank temperature airworthiness standards section 25.981.

**25.1329–1A Automatic Pilot System Approval (7–8–68).**

Sets forth an acceptable means by which compliance with the automatic pilot installation requirements of FAR 25.1329 may be shown.

**25.1457—1A Cockpit Voice Recorder Installations (11–3–69).**

Sets forth one acceptable means of compliance with provisions of FAR 25.1457 (b), (e), and (f) pertaining to area microphones, cockpit voice recorder location, and erasure features.

**29–1 Approval Basis for Automatic Stabilization Equipment (ASE) Installations in Rotorcraft (12–26–63).**

Gives means for compliance with flight requirements in various CAR's.

**29–1 CH 1 (3–26–64).**

Transmits revised information about the time delay of automatic stabilization equipment.

**29.773–1 Pilot Compartment View (1–19–66).**

Sets forth acceptable means, not the sole means, by which compliance with FAR 29.773(a)(1), may be shown.

**33–1B Turbine-Engine Foreign Object Ingestion and Rotor Blade Containment Type Certification Procedures (4–22–70).**

Provides guidance and acceptable means, not the sole means, by which compliance may be shown with the design and construction requirements, of Part 33 of the Federal Aviation Regulations.

**33–2A Aircraft Engine Type Certification Handbook (6–5–72).**

Contains guidance relating to type certification of aircraft engines which will constitute acceptable means, although not the sole means, of compliance with the Federal Aviation Regulations.

**33–3 Turbine and Compressor Rotors Type Certification Substantiation Procedures (9–9–68).**

Sets forth guidance and acceptable means, not the sole means, by which compliance may be shown with the turbine and compressor rotor substantiation requirements in FAR Part 33.

**36–1A Certificated Airplane Noise Levels (7–21–75).**

Provides noise level data for airplanes certificated under FAR Part 36 since its publication on Nov. 18, 1969.

**36–2 Estimated (Uncertificated) Noise Levels of Aircraft (9–21–76).**

Provides estimates of noise levels from airplanes not certificated to FAR Part 36 standards.

**37–2A Test Procedures for Maximum Allowable Airspeed Indicators (10–22–74).**

Provides guidance concerning test procedures which may be used in showing compliance with the standards in FAR 37.145 (TSO–C46a).

**37–3A Radio Technical Commission for Aeronautics Document DO–160 (3–20–75).**

This circular announces RTCA Document DO–160 and discusses how it may be used in connection with technical standard order authorizations.

**39–1A Jig Fixtures; Replacement of Wing Attach Angles and Doublers on Douglas Model DC–3 Series Aircraft Airworthiness Directive 66–18–2 (3–5–70).**

Describes methods of determining that jig fixtures used in the replacement of the subject attached angles and doublers meet the requirements of Airworthiness Directive 66–18–2.

**39–6E Summary of Airworthiness Directives (2–11–76).**

Announces the availability of Summary of Airworthiness Directives dated January 1, 1976 from the FAA in Oklahoma City and how to obtain them.

**43–2A Minimum Barometry for Calibration and Test of Atmospheric Pressure Instruments (8–22–74).**

Sets forth guidance material which may be used to determine the adequacy of barometers used in the calibration of aircraft static instruments and presents information concerning the general operation, calibration, and maintenance of such barometers.

**43–3 Nondestructive Testing in Aircraft (5–11–73).**

Reviews the basic principles underlying nondestructive testing. ($0.75 Supt. Docs.) SN 5007–00208.

**43–4 Corrosion Control for Aircraft (5–15–73).**

Summarizes current available data regarding identification and treatment of corrosive attack on aircraft structure and engine materials.

**43–4 CH 1 (3–1–74).**

Provides additional information on identification and treatment of corrosion attack on aircraft structures. Adds a new Chapter 14—Corrosion control of aircraft used in agricultural cropdusting operations.

**43–4 CH 2 (10–8–74).**

Clarifies the discussion on the removal of corrosion and treatment of corroded areas.

**43–5 Airworthiness Directives for General Aviation Aircraft (8–13–74).**

Points areas of misunderstanding regarding: (1) Aircraft owners and operators' responsibility for complying with AD's; (2) maintenance personnel responsibilities with regards to performance of AD's, and (3) maintenance records entries for AD's required by FAR 91.173(a)(2)(v) and FAR 43.9.

**43–6 Automatic Pressure Altitude Encoding Systems and Transponder Maintenance and Inspection Practices (9–19–74).**

Provides information on the installation of encoding altimeters based upon recently acquired operating experience and on the maintenance of ATC transponders.

**43–7 Ultrasonic Testing for Aircraft (9–24–74).**

Describes methods used in ultrasonic nondestructive testing, discusses the many advantages, and points out the simplicity of the tests. Contains many illustrations. ($1 Supt. Docs.) SN 050–007–00282–3.

**43–8 Maintaining Hot Air Balloons in an Airworthy Condition (1–2–75).**

Contains information designed to assist balloon owners and operators in maintaining hot air balloons in an airworthy condition. Advises how the mainsponsibility under FAR Section 43.9.

**43–9A Maintenance Records: General Aviation Aircraft (9–9–77).**

Provides information to assist maintenance personnel in fulfilling their responsibility under FAR Section 43.9.

**43–10 Mechanical Work Performed on U.S. and Canadian Registered Aircraft (1–26–76).**

Provides information and guidance to aircraft owners/operators and maintenance personnel concerning mechanical work performed on U.S. registered aircraft by Canadian maintenance personnel and on Canadian registered aircraft by U.S. maintenance personnel.

**43–11 Reciprocating Engine Overhaul Terminology and Standards (4–7–76).**

Discusses engine overhaul terminology and standards that are used by the aviation industry.

**43–12 Preventive Maintenance (7–16–76).**

Provides information concerning preventive maintenance and who may perform it.

**43–14 Maintenance of Weather Radar Radomes (2–24–77).**

Provides guidance material useful to repair facilities in the maintenance of weather radomes.

**43–15 Recommended Guidelines for Instrument Shops (8–15–77).**

Provides guidelines concerning environmental conditions for instrument repair and overhaul shops and information on calibration of test equipment.

**43.9–1C Instruction for Completion of FAA Form 337 (12–20–73).**

Provides instructions for completing revised FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance).

**43.13–1A Acceptable Methods, Techniques and Practices—Aircraft Inspection and Repair (4–17–72).**

Contains methods, techniques, and practices acceptable to the Administrator for inspection and repair to civil aircraft. Published in 1973. ($3.70—Supt. Docs.) SN 050–011–00058–5.

**43.13–1A CHG 1 (5–12–75).**

Transmits new and revised material for basic advisory circular. ($0.65—Supt. Docs.) SN 050–007–00294–7.

**43.13–1A Ch 2 (12–22–76).**

Transmits revised material concerning aircraft instrument adjustments. ($0.35 Supt. Docs.) SN 050–007–00368–4.

**43.13–2 Acceptable Methods, Techniques, and Practices—Aircraft Alterations (4–19–66).**

Contains methods, techniques, and practices acceptable to the Administrator in altering civil aircraft. Published in 1965. ($3.60–$4.50 foreign Sub.—Supt. Docs.)

Subscription now includes: Changes 1 thru 14 Consolidated Reprint in 1973, Change 15 dated 1–15–74, and Change 16 dated 8–12–74.

**43–203A Altimeter and Static System Tests and Inspections (6–6–67).**

Specifies acceptable methods for testing altimeter and static system. Also, provides general information on test equipment used and precautions to be taken.

**45–2 Identification and Registration Marking (7–7–72).**

Provides guidance and information concerning the identification and marking requirements of Federal Aviation Regulations (FAR) Parts 21 and 45, and where considered helpful, to provide an acceptable means, but not the sole means, of compliance with the regulations.

**47–1A Aircraft Registration, Eligibility, Identification and Activity Report (6–7–73).**

Advises owners and operators of U.S. civil aircraft of requirement for annual submission of current information related to aircraft registration eligibility, requests similar submission of information related to identification and activity of aircraft; and to call attention to the availability of the reporting form to be used.

## Airmen

SUBJECT NO. 60

**60–2M Annual Aviation Mechanic Safety Awards Program (2–6–75).**

Provides the details of the annual Aviation Mechanic Safety Awards Program.

**60–4 Pilot's Spatial Disorientation (2–9–65).**

Acquaints pilots flying under visual flight rules with the hazards of disorientation caused by the loss of reference with the natural horizon.

**60–6A Airplane Flight Manuals (AFM), Approved Manual Materials, Markings, and Placards—Airplanes (2–9–76).**

Alerts pilots to the regulatory requirements relating to the subject and provides information to aid pilots to comply with these requirements.

**60–9 Induction Icing—Pilot Precautions and Procedures (2–28–73).**

Provides the pilot with information on the causes and results of induction icing in reciprocating aircraft engines, and the precautions he should take to reduce the likelihood of icing, and the means available to him in controlling icing when it is encountered.

**60–10 Recommended Safety Parameters for Operation of Hang Gliders (5–16–74).**

Suggests safety parameters for the operation of "hang gliders" and to present the current FAA intent with respect to the regulation and operation of those vehicles.

**60–11 Aids Authorized for Use by Airman Written Test Applicants (8–27–74).**

Clarifies FAA policy concerning aids that applicants may use when taking airman written tests.

**60–12 Availability of Industry-Developed Guidelines for the Conduct of the Biennial Flight Review (2–11–76).**

Informs all FAA certificated flight instructors of the availability of, and how to obtain, the industry-developed guidelines for the conduct of the Biennial Flight Review.

**60–13 The Accident Prevention Counselor Program (4–27–76).**

Provides information to acquaint the general aviation community with the accident prevention counselor program and outlines the ways the accident prevention counselor force enhances aviation safety.

**60–14 Aviation Instructor's Handbook (7–7–76).**

Provides the aviation instructor with comprehensive, accurate, and easily understood information on learning and teaching and to relate this information to students. Cancels AC 61–16A. ($2.75 Supt. Docs.) SN 050–011–00072–1.

**60–15A Publication of New Written Test Study Guides (6–9–77).**

Announces the revision of the written test study guides for selected testing areas which will contain representative questions and responses used in the current FAA certification tests.

**61–8C—Instrument Rating (Airplane) Written Test Guide (5–31–72).**

Reflects the current operating procedures and techniques in a background setting appropriate for applicants preparing for the subject test. ($1.45 Supt. Docs.) SN 050–007–00183–5.

**61–9B Pilot Transition Courses for Complex Single-Engine and Light, Twin-engine Airplanes (1–15–74).**

A guide to the procedures and standards to be followed for a thorough and comprehensive checkout in modern single- and twin-engine aircraft. ($0.45 Supt. Docs.) SN 050–007–00226–2.

**61–10A Private and Commercial Pilots Refresher Courses (9–27–72).**

Provides a syllabus of study requirements and describes the areas of training that should be emphasized. ($0.55 Supt. Docs.) SN 050–011–00060–5.

**61–12H Student Pilot Guide (2–14–77).**

Provides guidance for student pilots and those already in primary flight training. Updated to include requirements covered in Part 61. ($1.50 Supt. Docs.) SN 050–007–00377–3.

**61–13A Basic Helicopter Handbook (4–5–73).**

Provides detailed information to applicants preparing for private, commercial, and flight instructor pilot certificates with a helicopter rating about helicopter aerodynamics, performance, and flight maneuvers. It will also be useful to certificated helicopter flight instructors as an aid in training students. ($2.50 Supt. Docs.) SN 050–011–00064–0.

**61–18D Airline Transport Pilot (Airplane) Written Test Guide (2–14–75).**

Reflects current operating procedures and techniques in a background setting appropriate for applicants preparing for the Airline Transport Pilot (Airplane) Written Test. ($2.05 Supt. Docs.) SN 050–007–00301–3.

**61–19 Safety Hazard Associated With Simulated Instrument Flights (12–4–64).**

Emphasizes the need for care in the use of any device restricting visibility while conducting simulated instrument flights that may also restrict the view of the safety pilot.

**61–21 Flight Training Handbook (1–11–66).**

Provide information and direction in the introduction and performance of training maneuvers for student pilots, pilots requalifying or preparing for additional ratings, and flight instructors. Reprinted in 1969. ($2.15 Supt. Docs.) SN 050–007–00008–1.

**61–23A Pilot's Handbook of Aeronautical Knowledge (7–10–70).**

Contains essential, authoritative information used in training and guiding applicants for private pilot certification, flight instructors, and flying school staffs. ($5.30 Supt. Docs.) SN 050–011–00051–8.

**61–27B Instrument Flying Handbook (9–22–70).**

Provides the pilot with basic information needed to acquire an FAA instrument rating. It is designed for the reader who holds at least a private pilot certificate and is knowledgeable in all areas covered in the "Pilot's Handbook of Aeronautical Knowledge." ($3.35 Supt. Docs.) SN 050–007–00067–7.

**61–31B Gyroplane Pilot Written Test Guide, Private and Commercial (4–14–76).**

Provides guidance and assistance to applicants who are preparing for the Private or Commercial Pilot Certificate with a Rotorcraft-Gyroplane Rating under the provisions of FAR Part 61.

**61–31B Chg 1 (5–13–77).**

**61–32B Private Pilot—Airplane—Written Test Guide (5–2–77).**

Provides information, guidelines, and sample test items to assist applicants for the Private Pilot Certificate in attaining necessary aeronautical knowledge ($2.30 Supt. Docs.) SN 050–011–00073–9.

**61–34B Federal Aviation Regulations Written Test Guide for Private, Commercial and Military Pilots (2–10–75).**

Outlines the scope of the basic knowledge required of civilian or military pilots who are studying FARs as they pertain to the Regulations terminology; to the certification of private and commercial pilots; to the operation of aircraft in the national airspace; and to the requirements of the National Transportation Safety Board. For use as a guide in preparing for the FAR Written Test. ($0.70 Supt. Docs.) SN 050–007–00288–2.

**61–42A Airline Transport Pilot (Helicopter) Written Test Guide (1–20–72).**

Describes the type and scope of required aeronautical knowledge covered in the written tests, lists reference materials available from GPO bookstores, and presents sample test items with answers and explanations. ($0.70 Supt. Docs.) SN 050–011–00057–7.

**61–43A Glider Pilot Written Test Guide—Private and Commercial (1–12–72).**

Provides information, guidelines, and sample test items, to assist applicants for the Glider Pilot certificate in attaining necessary aeronautical knowledge.

**61–45 Instrument Rating (Helicopter) Written Test Guide (1–24–68).**

Assists applicants who are preparing for the helicopter instrument rating. Presents a study outline, study materials and a sample test with answers.

**61–47 Use of Approach Slope Indicators for Pilot Training (9–16–70).**

Informs pilot schools, flight instructors and student pilots of the recommendation of the Federal Aviation Administration on the use of approach slope indicator systems for pilot training.

**61–51 Reporting Flight Time on Pilot Applications, FAA Form 8420–3 (6–26–72).**

Advises applicants of the importance of entering their pilot flight time on subject form. (OBM No. 04–R0064.)

**61–52B Flight Instructor of the Year Award Program (1–5–74).**

Provides the details of the Flight Instructor of the Year Award Program.

**61–54A Private Pilot Airplane . . . Flight Test Guide (4–18–75).**

Contains information and guidance concerning the pilot operations, procedures, and maneuvers relevant to the airplane category with a single-engine land/sea or multiengine land/sea rating. ($1.35 Supt. Docs.) SN 050–007–00300–5.

**61–55A Commercial Pilot Airplane . . . Flight Test Guide (4–25–75).**

Assists the applicant and the instructor in preparing for the flight test for certification as a commercial pilot with single engine land or sea rating and for multiengine land or sea ratings. ($1.10 Supt. Docs.) SN 050–007–00295–5.

**61–56A Flight Test Guide, Instrument Pilot Airplane (5–7–76).**

Assists the applicant and the instructor in preparing for the flight test for the Instrument Pilot Airplane Rating. ($0.55 Supt. Docs.) SN 050–007–00343–9.

**61–57A Type Rating, Airplane, Flight Test Guide (5–1–75).**

Contains information and guidance concerning the pilot operations, procedures, and maneuvers relevant to the flight test required for an Airplane Type Rating. ($0.70 Supt. Docs.) SN 050–007–00299–8.

**61–58 Flight Instructor Practical Test Guide (5–1–73).**

Outlines new requirements based on changes to FAR Part 61, Certification of Pilots and Flight Instructors. ($0.50 Supt. Docs.) SN 050–011–00067–4.

**61–59A Private and Commercial Pilot—Helicopter—Flight Test Guide (3–3–77).**

Assists applicants for the Private or Commerical Pilot Rotorcraft Certificate with Helicopter Rating in preparing for their certification flight test. ($1.60 Supt. Docs.) SN 050–007–00384–6.

**61–60 Private and Commercial Pilot Gyroplane, Flight Test Guide (May 1973).**

Outlines appropriate pilot operations and the minimum standards for the performance of each procedure or maneu-

ver which will be accepted by the examiner as evidence of the pilot's competency, under Part 61 (revised). ($0.65 Supt. Docs.) SN 050-011-00066-6.

**61-61A Private and Commercial Pilot—Glider—Flight Test Guide (12-3-76).**

Prepared to assist the applicant and the instructor in preparing for the flight test for the Private and the Commercial Pilot certificate with Glider Rating. Contains information concerning pilot operations, procedures and maneuvers relevant to the flight test. ($1.50 Supt. Docs.) SN 050-011-00071-2.

**61-62A Private and Commercial Pilot—Free Balloon—Flight Test Guide (12-17-76).**

Prepared to assist the applicant in preparing for the flight test for the Private or Commerical Pilot Certificate with a lighter-than-air category and free balloon class. Contains information concerning the operations, procedures, and maneuvers relevant to the flight test. ($1.10 Supt. Docs.) SN 050-007-00375-7.

**61-63 Flight Test Guide, Private and Commercial Pilot—Lighter-Than-Air Airship (5-23-74).**

Establishes a new concept of pilot training and certification requirements. To provide a transition to these revised requirements, Part 61 (revised) permits the applicant, for a period of 1 year after the effective date, to meet either the previous requirements for the Private Pilot Certificate as outlined in Part 61, prior to November 1, 1973.

**61-64 Flight Test Guide—Instrument Pilot Helicopter (7-23-73).**

Assists the applicant and his instructor in preparing for the flight test for the instrument Pilot Helicopter Rating under the revised Part 61 ($0.55 Supt. Docs.) SN 050-007-00215-7.

**61-65 Part 61 (Revised) Certification: Pilot and Flight Instructors (9-5-73).**

Informs pilots and flight instructors of the changes in Part 61, revised January 23, 1973, their effects, and the standards and procedures which will be used in implementing them.

**61-66 Annual Pilot in Command Proficiency Checks (11-2-73).**

Presents material relating to annual proficiency checks required for pilots-in-command of civil aircraft type certificated for more than one required pilot crewmember, other than those operating under Parts 121, 123, 127, 133, 135, and 137.

**61-67 Hazards Associated with Spins in Airplanes Prohibited from Intentional Spinning (2-1-74).**

Informs pilots of the airworthiness standards for the type certification of small airplanes prescribed in Section 23.221 of the Federal Aviation Regulations concerning spin maneuvers.

**61-68 Flight Instructor Refresher Clinics—Scheduling, Attendance, Facilities, and Equipment (2-27-74).**

Provides guidance to sponsors regarding scheduling, required facilities and equipment, and attendance control at Flight Instructor Refresher Clinics in which the Flight Instructor Refresher Unit (FIRU) participates.

**61-70 Flight Instructor Instrument—Airplane—Written Test Guide (3-29-74).**

Provides guidance for the applicant by outlining the scope of knowledge required for the Flight Instructor Certificate with an Instrument Airplane Rating. ($1.65 Supt. Docs.) SN 050-007-00252-1.

**61-71A Commercial Pilot Airplane Written Test Guide (3-24-77).**

Outlines the aeronautical knowledge requirements for a commerical pilot rating, outlines source material for study, and includes representative test items and illustrations used in the FAA written test. ($2.30 Supt. Docs.) SN 050-007-00385-4.

**61-72A Flight Instructor—Airplane—Written Test Guide (3-24-77).**

Outlines the aeronautical knowledge requirements for certification as an airplane flight instructor, outlines source material for study, and provides representative test questions for the FAA written test. ($2.70 Supt. Docs.) SN 050-007-00386-2.

**61-73 Private and Commercial Pilot Rotorcraft—Helicopter Written Test Guide (8-8-74).**

Assists applicants who are preparing for the Private or Commercial Pilot certificate with a Rotorcraft—Helicopter rating under the provisions of FAR Part 61 (revised). ($1.20 Supt. Docs.) SN 050-007-00265-3.

**AC 61-74A Flight Instructor, Rotorcraft—Helicopter Written Test Guide (5-27-77).**

Assists applicants who are preparing for the Flight Instructor Certificate with a Rotorcraft—Helicopter Rating. ($2.30 Supt. Docs.) SN 050-007-00400-1.

**AC 61-75 Flight Instructor—Glider—Written Test Guide (9-18-74).**

Assists applicants who are preparing for the Flight Instructor—Glider Written Test. ($1.50 Supt. Docs.) SN 050-007-00271-8.

**61-77 Airline Transport Pilot Airplane Practical Test Guide (Part 61 Revised) (4-23-74).**

Designed to assist the applicant and his instructor in preparing for the Airline Transport Pilot Certificate with an Airplane Rating under FAR Part 61 (revised). ($0.50 Supt. Docs.) SN 050-007-00257-2.

**61-81 Private and Commercial Pilot—Glider—Written Test Guide (4-27-76).**

Contains a comprehensive study outline and a list of recommended study materials. Sample study questions and illustrations pertinent to the subject of glider flying are included ($1.60 Supt. Docs.) SN 050-007-00339-1.

**61-82 Airline Transport Pilot—Helicopter—Flight Test Guide (8-25-76).**

Describes procedures and maneuvers relevant to the ATP Certificate—Helicopter—that is limited to VFR and that which is not limited to VFR. Includes a suggested flight test checklist. ($0.80 Supt. Docs.) SN 050-007-00358-7.

**61-83 Nationally Scheduled Federal Aviation Administration (FAA)-Approved, Industry-Conducted Flight Instructor Refresher Clinics (9-3-76).**

Announces a concept pertaining to FAA-approved, industry-conducted Flight Instructor Refresher Clinics, outlines procedures for approval, and invites participation by interested industry groups.

**61-84 Role of Preflight Preparation (4-11-77).**

Provides guidance information on some elements of flight planning that should be considered in planning and conducting a safe, efficient flight.

**61-86 Pilot Type Rating Certificate Information (6-30-77).**

Provides pilot certificate designations adopted by the FAA for aircraft type ratings issued with pilot certificates.

**63-1B Flight Engineer Written Test Guide (10-22-70).**

Provides information to prospective flight engineers and others interested in this certification area. Contains information about certification requirements and describes the type and scope of the written test. Lists appropriate study and reference material and presents sample questions similar to those found in the official written tests. ($0.85 Supt. Docs.) SN 050-007-00164-9.

**63-2A Flight Navigator Written Test Guide (4-4-69).**

Defines the scope and narrows the field of study to the basic knowledge required for the Flight Navigator Certificate. Published in 1969. ($0.70 Supt. Docs.) SN 050-007-00064-2.

**65-2D Airframe and Powerplant Mechanics Certification Guide (1-30-76).**

Provides information to prospective airframe and powerplant mechanics and other persons interested in FAA certification of aviation mechanics. ($1.30 Supt. Docs.) SN 050-007-00331-5.

**65-4B Aircraft Dispatcher Written Test Guide (7-25-72).**

Describes the type and scope of aeronautical knowledge covered by the aircraft dispatcher written examination, lists reference materials, and presents sample questions. ($1.40 Supt. Docs.) SN 050-007-00190-8.

**65–5A Parachute Rigger—Senior/ Master—Certification Guide (12–20–74).**

Provides information on how to apply for a parachute rigger certificate or rating and assists the applicant in preparing for the written, oral, and practical tests. ($0.75 Supt. Docs.) SN 050–007–00287–4.

**65–9A Airframe and Powerplant Mechanics—General Handbook (4–12–76).**

Designed as a study manual for persons preparing for a mechanic certificate with airframe or powerplant ratings. Emphasis in this volume is on theory and methods of application, and is intended to provide basic information on principles, fundamentals, and airframe and powerplant ratings. ($6.75 Supt. Docs.) SN 050–007–00379–0.

**65–11A Airframe and Powerplant Mechanics Certification Information (4–21–71).**

Provides answers to questions most frequently asked about Federal Aviation Administration certification of aviation mechanics. ($0.40 Supt. Docs.) SN 050–007–00171–1.

**65–12A Airframe and Powerplant Mechanics Powerplant Handbook (4–12–76).**

Designed to familiarize student mechanics with the construction, theory of operation, and maintenance of aircraft powerplants. ($6.50 Supt. Docs.) SN 050–007–00373–1.

**65–13C FAA Inspection Authorization Directory (10–19–77).**

Provides a new directory of all FAA certificated mechanics who hold an inspection authorization as of Aug. 31, 1977.

**65–15A Airframe and Powerplant Mechanics Airframe Handbook (4–12–76).**

Designed to familiarize student mechanics with airframe construction, repair, and the operating theory of airframe systems. ($6.00 Supt. Docs.) SN 050–007–00391–9.

**65–18 Report Availability of a Survey of the Aviation Mechanics Occupation (9–4–74).**

Announces the public availability of the 1974 report on a Survey of the Aviation Mechanics Occupation.

**65–19A Inspection Authorization Study Guide (11–17–76).**

Provides guidance for persons who conduct annual and progressive inspections and approve major repairs and/or alternations of aircraft. It stresses the importance that certificated mechanics, holding IA's, have in air safety. Primarily intended for mechanics who hold or are preparing to take the test for an inspection authorization. ($0.65 Supt. Docs.) SN 050–007–00332–3.

**67–1 Medical Information for Air Ambulance Operators (3–4–74).**

Provides persons or groups interested or involved in civil air ambulance activities with information governing the transport of patients by air.

**67–2 Medical Handbook for Pilots (5–15–74).**

An aviation medicine handbook written in pilots language that provides guidance on when, and when not, to fly. Emphasizes the fact that, to be a good pilot, you must be physically fit, psychologically sound, and well trained. Designed to complement the Pilots Handbook of Aeronautical Knowledge. ($1.45 Supt. Docs.) SN 050–007–00254–8.

## Airspace

SUBJECT NO. 70

**70–2B Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation and Deactivation of Airports (9–23–77).**

Advises those persons proposing to construct, alter, activate or deactivate a civil or joint-use (civil/military) airport, for which Federal aid has not been requested of the Federal Aviation Administration.

**70/7460–1E Obstruction Marking and Lighting (11–1–76).**

Describes FAA standards on obstruction marking and lighting and establishes the methods, procedures, and equipment types for both aviation red and high-intensity white obstruction lights.

**70/7460–2E Proposed Construction or Alteration of Objects that may Affect the Navigable Airspace (7–5–73).**

Advises those persons proposing to erect or alter an object that may affect the navigable airspace of the requirement to submit a notice to the Administrator of the Federal Aviation Administration (FAA).

**70/7460–3 Petitioning the Administrator for Discretionary Review; Section 77.37, FAR (8–8–68).**

Revises and updates information concerning the submission of petitions to the Administrator for review, extension, or revision of determinations issued by regional directors or their designees.

**73–1 Establishment of Alert Areas (3–11–68).**

Announces the establishment of alert areas and sets forth the procedures which FAA will follow in establishing such areas.

## Air Traffic Control and General Operations

SUBJECT NO. 90

**90–1A Civil Use of U.S. Government Produced Instrument Approach Charts (4–10–68).**

Clarifies landing minimums requirements and revises instrument approach charts.

**90–5 Coordination of Air Traffic Control Procedures and Criteria (6–13–63).**

States Air Traffic Service policy respecting coordination of air traffic procedures and criteria with outside agencies and/or organizations.

**90–14A Altitude—Temperature Effect on Aircraft Performance (1–26–68).**

Introduces the Denalt Performance Computer and reemphasizes the hazardous effects density altitude can have on aircraft.

**90–23D Wake Turbulence (12–15–72).**

Alerts pilots to the hazards of aircraft trailing vortex wake turbulence and recommends related operational procedures.

**90–34 Accidents Resulting from Wheelbarrowing in Tricycle Gear Equipped Aircraft (2–27–68).**

Explains "wheelbarrowing", the circumstances under which it is likely to occur, and recommended corrective action.

**90–42A Traffic Advisory Practices at Nontower Airports (8–16–72).**

Establishes, as good operating practices, procedures for pilots to be apprised of or exchange traffic information, when approaching or departing uncontrolled airports.

**90–43D Operations Reservations for High-Density Traffic Airports (7–20–77).**

Advises the aviation community of the means for all aircraft operators, except helicopters, scheduled and supplemental air carriers and scheduled air taxis, to obtain a reservation to operate to and/or from designated high-density traffic airports.

**AC 90–45A Approval of Area Navigation Systems for Use in the U.S. National Airspace System (2–21–75).**

Provides guidelines for implementation of two-dimensional area navigation (2D RNAV) within the U.S. National Airspace System (NAS). Provides for both VOR/DME dependent systems and self-contained systems such as Inertial Navigation Systems (INS).

**90–45A Ch 1 (9–15–75).**

**90–45A Ch 2 (7–22–76).**

**90–48 Pilots' Role in Collision Avoidance (3–20–70).**

Alerts all pilots to the midair collision and near midair collision hazard and to emphasize those basic problem areas of concern, as related to the human casual factors, where improvements in pilot education, operating practices, procedures, and techniques are needed to reduce midair conflicts.

**AC 90–50A VHF Radio Frequency Assignment Plan for Aeronautical Operations (2–7–75).**

Describes the civil air traffic control assignment of frequencies in the very high frequency (118–136 MHz) band.

**90–58C VOR Course Errors Resulting from 50 kHz Channel Mis-Selection (4–7–75).**

Provides information concerning a potentially hazardous situatic when a 200 channel VOR receiver is inadvertently mistuned by 50 kHz from the frequency of a 100 kHz ground station.

**90–60 Weather Observation Reporting Obscured or Partially Obscured Sky Condition (3–31–72).**

Provides pilots with information concerning weather conditions reported by weather observers as obscuration or partial obscuration.

**90–62 Flying DME Arcs (1–23–73).**

Describes the procedures and techniques for intercepting DME arcs from radials, maintaining DME arcs, and intercepting radials and localizers from DME arcs.

**90–64 Automated Radar Terminal System (ARTS) III (6–22–73).**

Advises the aviation community of the capabilities of the Automated Radar Terminal System and the associated services provided by ARTS III equipped air traffic control facilities.

**90–65 Air Traffic Fuel Economy Program (1–18–74).**

Advises the aviation community of flow control procedures that will be utilized to conserve aviation fuel during periods when the normal movement of aircraft is disrupted. Also describes actions required of user groups to ensure efficient flow control planning.

**AC 90–66 Recommended Standard Traffic Patterns for Airplane Operations at Uncontrolled Airports (2–27–75).**

Calls attention to regulatory requirements for the operations of airplanes at uncontrolled airports. Recommends voluntary use of standard traffic pattern flight procedures.

**90–67 Light Signals from the Control Tower for Ground Vehicles, Equipment, and Personnel (8–15–75).**

Provides the aviation community with the meaning of the light signals used when communicating with ground vehicles, equipment, and personnel on the airport movement area from the control tower.

**90–70 Straight-In Nonprecision Instrument Approach Procedures Visual Descent Point (VDP) (7–7–76).**

Describes the concept, purpose, and use of a designated and published VDP to be provided on some straight-in nonprecision instrument approach procedures.

**90–72 Minimum Safe Altitude Warning (MSAW) (11–30–76).**

Describes the capabilities and limitations of the MSAW function being implemented at terminal facilities equipped with ARTS III.

**90–73 Local Flow Traffic Management (1–13–77).**

Describes new arrival procedures for ATC handling of high-performance aircraft.

**90–74 Announcing the Availability of United States Terminal Instrument Procedures (TERPS) (2–4–77).**

Announces the availability to the public of the Third Edition of the U.S. Standard for Terminal Instrument Procedures which is available from the Supt. of Docs. for $2.80. SN 050–007–00345–5.

**90–75 Strobe Light System Inspection Practices (2–10–77).**

Advises the general aviation community of the importance of proper maintenance of capacitive discharge strobe light systems which are installed within or near fuel systems.

**90–76 Flight Operations in Oceanic Airspace (4–15–77).**

Describes the basic requirements, limitations, and considerations applicable to flight proposed into oceanic airspace under U.S. ATC jurisdiction.

**91–5B Waivers of Subpart B, Part 91 of the Federal Aviation Regulations (FARs) (1–28–72).**

Provides information concerning the submission of applications for and the issuance of waivers of Subpart B, FAR Part 91.

**91–6 Water, Slush, and Snow on the Runway (1–21–65).**

Provides background and guidelines concerning the operation of turbojet aircraft with water, slush, and/or snow on the runway.

**91–8A Use of Oxygen by General Aviation Pilots/Passengers (8–11–70).**

Provides general aviation personnel with information concerning the use of oxygen.

**91–9 Potential Hazards Associated With Turbojet Ground Operations (6–19–65).**

Alerts turbojet operators and flight crews to potential hazards involving turbojet operations at airports.

**91–11A Annual Inspection Reminder (12–3–69).**

Provides the aviation community with a uniform visual reminder of the date an annual inspection becomes due. (Reference section 91.169(a)(1) of the FAR's.)

**91.11–1 Guide to Drug Hazards in Aviation Medicine (7–19–63).**

Lists all commonly used drugs by pharmacological effect on airmen with side effects and recommendations. Reprinted 1970. ($1.15 Supt. Docs.) SN 050–009–00001–7.

**91–13A Cold weather Operation of Aircraft (1–2–70).**

Provides background and guidelines relating to operation of aircraft in the colder climates where wide temperature changes may occur.

**91–14B Altimeter Setting Sources (10–1–71).**

Provides the aviation public, industry, and FAA filed personnel with guidelines for setting up reliable altimeter setting sources.

**91–15 Terrain Flying (2–2–67).**

A pocket-size booklet designed as a tool for the average private pilot. Contains a composite picture of the observations, opinions, warnings, and advice from veteran pilots who have flown this vast land of ours that can help to make flying more pleasant and safer. Tips on flying into Mexico, Canada, and Alaska. ($1.40 Supt. Docs.) SN 050–007–00147–9.

**91–16 Category II Operations—General Aviation Airplanes (8–7–67).**

Sets forth acceptable means by which Category II operations may be approved in accordance with FAR Parts 23, 25, 61, 91, 97, and 135.

**91–17 The Use of View Limiting Devices on Aircraft (2–20–68).**

Alerts pilots to the continuing need to make judicious and cautious use of all view limiting devices on aircraft.

**91–22A Altitude Alerting Devices/Systems (12–23–71).**

Provides guidelines for designing, installing, and evaluating altitude alerting systems.

**91–23A Pilot's Weight and Balance Handbook (6–9–77).**

Provides an easily understood text on aircraft weight and balance for pilots who need to appreciate the importance of weight and balance control for safety of flight. Progresses from an explanation of basic fundamentals to the complete application of weight and balance principles in large aircraft operations. ($2.30 Supt. Docs.) SN 050–007–00405–2.

**91–24 Aircraft Hydroplaning or Aquaplaning on Wet Runways (9–4–69).**

Provides information to the problem of aircraft tires hydroplaning on wet runways.

**91–25A Los of Visual Cues During Low Visibility Landings (6–22–72).**

Provides information concerning the importance of maintaining adequate visual cues during the descent below MDA or DA.

**91–26 Maintenance and Handling of Air-Driven Gyroscopic Instruments (10–29–69).**

Advises operators of general aviation aircraft of the need for proper maintenance of air-driven gyroscopic instruments and associated air filters.

**91–28 Unexpected Opening of Cabin Doors (12–23–69).**

Outlines the importance of assuring that cabin doors are properly closed prior to takeoff.

**91–32 Safety in and Around Helicopters (5–7–71).**

Provides suggestions to improve helicopter safety by means of acquainting

nonflight crew personnel and passengers with the precautions and procedures necessary to avoid undue hazards.

**91–33 Use of Alternate Grades of Aviation Gasoline for Grade 80/87 (10–6–71).**

Provides information relating to the use of alternate grades of aviation gasoline when grade 80/87 is not available, and the resultant effects of the use of the alternate fuels which may have higher TEL (tetraethyl lead) content.

**91–34 Model Aircraft Operating Standards (7–1–72).**

Outlines safety standards for operators of model aircraft, and encourages voluntary compliance with these standards.

**91–35 Noise, Hearing Damage, and Fatigue in General Aviation Pilots (3–28–72).**

Aquaints pilots with the hazards of regular exposure to cockpit noise. Especially pertinent are piston-engine, fixed-wing, and rotary-wing aircraft.

**91–36A VFR Flight Near Noise-Sensitive Areas (7–9–74).**

Encourages pilots making VFR flights near noise-sensitive areas to fly at altitudes higher than the minimum permitted by regulation. National Park areas now included.

**91–37 Truth in Leasing (11–9–72).**

Provides information and guidance for leasees and conditional buyers of U.S. registered large civil aircraft.

**91–38 Large and Turbine-Powered Multiengine Airplanes, Part 91, Subpart D (12–13–72).**

Sets forth guidelines and procedures to assist operators of large and turbine-powered multiengine airplanes in meeting the safety requirements of FAR, Part 91, Subpart D.

**91–41 Ground Operational Procedures for Aircraft Engine Emission Reduction and Fuel Conservation (3–12–74).**

Recommends ground operational procedures that will minimize air pollution from aircraft ground operations and conserve fuel.

**AC 91–42A Hazards of Rotating Propellers and Helicopter Rotor Blades (10–19–76).**

Provides information on propeller- and rotor-to-person accidents and offers suggestions to reduce the frequency of their occurrence.

**AC 91–43 Unreliable Airspeed Indications (6–26–75).**

Alerts pilots to the possibility of erroneous airspeed/Mach indications that may be caused by blocking or freezing of the pitot system and advises of corrective action that can be taken.

**91–44 Emergency Locator Transmitters Operational and Maintenance Practices (2–20–76).**

Provides guidelines relative to the installation, maintenance, and operation of emergency locator transmitters.

**91–45A Airshow Waivers (5–16–77).**

The purpose of this advisory circular is to provide prospective airshow sponsors with the information necessary to plan for and conduct safe, effective airshows. It is also intended to provide information pertaining to the procedures and requirements for issuance of airshow waivers.

**91–46 Gyroscopic Instruments—Good Operating Practices (2–4–77).**

Issued to re-emphasize to general aviation instrument-rated pilots the need to determine the proper operation of gyroscopic instruments, the importance of instrument cross-checks and proficiency in partial-panel operations.

**91–47 Use of Portable Electronic Devices—Radio Receivers (3–23–77).**

Intended to remind air carrier or commercial operators of the requirements of FAR 91.19 as they apply to pocket size radio receivers capable of reception in the 110–140 MHz band.

**91–48 Acrobatics—Precision Flying With a Purpose (6–29–77).**

Provides information to persons who are interested in acrobatic flying to improve their piloting skills as recreation, sport, or as a competitive activity.

**91–49 General Aviation Procedures for Flight in North Atlantic Minimum Navigation Performance Specifications Airspace (8–23–77).**

Sets forth acceptable means, but not the only means, of obtaining authorization to operate within specified airspace over the North Atlantic, designated as the NAT (North Atlantic) MNPS (Minimum Navigation Performance Specifications) airspace, after 0001 Greenwich Mean Time, Dec. 29, 1977. This requirement applies to persons operating under FAR Part 91 and for FAR Part 135 certificate holders, except those operating under Section 135.2.

**91–50 Importance of Transponder Operation and Altitude Reporting (8–24–77).**

Provides information and guidance concerning the importance of transponder operation and altitude reporting in the National Airspace System.

**91–51 Airplane Deice and Anti-Ice Systems (9–15–77).**

Provides information to pilots regarding ice protection system approval and the results of in-flight icing.

**91.29–1 Special Structural Inspections (1–8–68).**

Discusses occurrences which may cause structural damage affecting the airworthiness of aircraft.

**91.79–1 Waivers of Section 91.79 of the Federal Aviation Regulations (4–21–76).**

Announces the availability of waivers relating to FAR 91.79 and requests that interested persons contact any General Aviation District Office or Flight Standards District Office for specific information.

**91.83–1A Canceling or Closing Flight Plans (3–25–75).**

Outlines the need for canceling or closing flight plans promptly to avoid costly search and rescue operations.

**91.83–2 IFR Flight Plan Route Information (2–16–66).**

Clarifies the air traffic control needs for the filing of route information in an IFR (Instrument Flight Rules) flight plan.

**95–1 Airway and Route Obstruction Clearance (6–17–65).**

Advises all interested persons of the airspace areas within which obstruction clearance is considered in the establishment of Minimum En Route Instrument Altitudes (MEA's) for publication in FAR Part 95.

**97–1A Runway Visual Range (RVR) (9–28–77).**

Describes RVR measuring equipment and its operating use.

**99–1 Security Control of Air Traffic (1–12–72).**

Provides civil aviation with recommended practices for operating aircraft within or penetrating an Air Defense Identification Zone (ADIZ).

**101–1 Waivers of Part 101, Federal Aviation Regulations (1–13–64).**

Provides information on submission of applications and issuances of waivers to FAR Part 101.

**103–4 Hazard Associated with Sublimation of Solid Carbon Dioxide (Dry Ice) Aboard Aircraft (5–1–74).**

Discusses the potential hazard associated with the sublimation of dry ice aboard aircraft. Precautionary measures and simple rules of thumb are indicated in order to preclude environmentally hazardous conditions affecting crews and passengers aboard aircraft.

**105–2 Sport Parachute Jumping (9–6–68).**

Provides suggestions to improve sport parachuting safety; information to assist parachutists in complying with FAR Part 105; and a list of aircraft which may be operated with one cabin door removed, including the procedures for obtaining FAA authorization for door removal.

**107–1 Aviation Security—Airports (5–19–72).**

Furnishes guidance to those individuals and organizations having responsibilities under Part 107 of the Federal

Aviation Regulations. It also provides recommendations for establishing and improving security for restricted or critical facilities and areas the security of which is not dealt with in Part 107.

### Air Carrier and Commercial Operators and Helicopters

SUBJECT No. 120

**120–2A Precautionary Propeller Feathering To Prevent Runaway Propellers (8–20–63).**

Emphasizes the need for prompt feathering when there is an indication of internal engine failure.

**120–5 High Altitude Operations in Areas of Turbulence (8–26–63).**

Recommends procedures for use by jet pilots when penetrating areas of severe turbulence.

**120–7A Minimum Altitudes for Conducting Certain Emergency Flight Training Maneuvers and Procedures (7–27–70).**

Issued to emphasize to all air carriers and other operators of large aircraft the necessity for establishing minimum altitudes above the terrain or water when conducting certain simulated emergency flight training maneuvers.

**120–12 Private Carriage Versus Common Carriage by Commercial Operators Using Large Aircraft (6–24–64).**

Provides guidelines for determining whether current or proposed transportation operations by air constitute private or common carriage.

**120–16A Continuous Airworthiness Program (9–11–69).**

Provides air carriers and commercial operators with guidance and information pertinent to certain provisions of Federal Aviation Regulations Parts 121 and 127.

**120–17 Handbook for Maintenance Control by Reliability Methods (12–31–64).**

Provides information and guidance materials which may be used to design or develop maintenance reliability programs which include a standard for determining the time limitations.

**120–17 CH1 (6–24–66).**

**120–17 CH2 (5–6–68).**

**120–26D Civil Aircraft Operator Designators (11–11–76).**

Revises the criteria and states the procedures for the assignment of International Civil Aviation Organization two-letter and FAA three-letter aircraft company designators.

**120–27 Aircraft Weight and Balance Control (10–15–68).**

Provides a method and procedures for weight and balance control.

**120–27 CH1 (11–20–73).**

Adds Part 123 to subject circular.

**120–28A Criteria for Approval of Category IIIa Landing Weather Minima (12–14–71).**

States an acceptable means, not the only means, for obtaining approval of Category IIIa minima and the installation approval of the associated airborne systems.

**120–28A CH1 (1–18–73).**

Revises the CAT IIIa Landing Weather Minima maintenance requirements of paragraph 8 to make them consistent with the requirements for CAT IIa.

**120–29 Criteria for Approving Category I and Category II Landing Minima for FAR 121 Operators (9–25–70).**

Sets forth criteria used by FAA in approving turbojet landing minima of less than 300–¾ or RVR 4,000 (Category I) and Category II minima for all aircraft.

**120–29 CH 1 (12–15–71).**

Revises Appendix 1 and deletes statement in Appendix 2 regarding 19-foot criteria (does not apply when using an approved automatic landing system).

**120–29 CH 2 (7–26–72).**

Clarifies the airborne system evaluation by stressing the necessity for meeting maintenance program requirements.

**120–29 CH 3 (12–3–74).**

Outlines the recent change in FAR Part 121 wherein both initial and recurrent pilot qualification for both Category I and II proficiency checks may be performed in a visual simulator.

**120–30A Reporting Requirements of Air Carriers, Commercial Operators, Travel Clubs, and Air Taxi Operators of Large and Small Aircraft (9–8–76).**

This advisory circular is issued to clarify the mechanical reliability reporting requirements contained in Parts 121, 127, and 135 of the Federal Aviation Regulations (FAR) and the accident and incident reporting requirements of Part 830 (old Part 430) of the National Transportation Safety Board (NTSB), Safety Investigation Regulations.

**120–31A Operational and Airworthiness Approval of Airborne Omega Radio Navigation Systems as a Means of Updating Self-Contained Navigation Systems (4–21–77).**

Sets forth an acceptable means, but not the only means, of obtaining airworthiness and operational approval of airborne OMEGA navigation systems used in updating self-contained navigation systems such as Doppler Radar and Inertial for operations outside the United States under FAR Part 121.

**120–32 Air Transportation of Handicapped Persons (3–25–77).**

Identifies some of the problems handicapped air travelers face and provides some guidelines to airline personnel to help alleviate these problems.

**120–33 Operational Approval of Airborne Long-Range Navigation Systems for Flight Within the North Atlantic Minimum Navigation Performance Specifications Airspace (6–24–77).**

Sets forth acceptable means, but not the only means, for operators certificated under FAR Parts 121 or 123 and operators utilizing large aircraft under FAR 135.2, to obtain approval to operate within a specific airspace over the NAT (North Atlantic) MNPS (Minimum Navigation Performance Specifications) airspace after 0001 Greenwich Mean Time, Dec. 29, 1977.

**120–34 Air Transportation of Mental Patients (6–29–77).**

Provides guidelines to organizations and persons responsible for transportation of mental patients and outlines the responsibilities of those escorting such persons.

**121–1A Standard Operations Specifications—Aircraft Maintenance Handbook (6–26–73).**

Provides procedures acceptable to the Federal Aviation Administration which may be used by operators when establishing inspection intervals and overhaul times.

**121–1A CH 1 (1–23–75).**

Updates the overhaul and inspection/check period of selected airframes, powerplants, propellers, and appliances in relation to current industry standards.

**121–1A CH 2 (8–19–76).**

**121–1A CH 3 (2–18–77).**

**121–3Q Maintenance Review Board Reports (9–3–76).**

Revises the list of Maintenance Review Board Reports that are currently in effect.

**121–6 Portable Battery-Powered Megaphones (1–5–66).**

Sets forth an acceptable means for complying with rules (applicable to various persons operating under Part 121 of the Federal Aviation Regulations) that prescribe the installation of approved megaphones.

**121–12 Wet or Slippery Runways (8–17–67).**

Provides uniform guidelines in the application of the "wet runway" rule by certificate holders operating under FAR 121.

**121–13 Self-Contained Navigation Systems (Long Range) (10–14–69).**

States an acceptable means, not the only means, of compliance with the referenced sections of the FAR as they apply to persons operating under Parts 121 or 123 who desire approval of Doppler RADAR navigation systems or Inertial Navigation Systems (INS) for use in their operations.

**121–13 CH 1 (7–31–70).**

Assures standardization of the Minimum Equipment List (MEL) with respect to Inertial Navigation Systems (INS) through the appropriate Flight Operations Evaluation Board (FOEB).

**121–13 CH 2 (12–21–70).**

Permits all flight training for Doppler and INS qualification, to be completed in a simulator or training device approved for conducting the required pilot training and qualifications in the use of these systems.

**121–14A Aircraft Simulator Evaluation and Approval (2–9–76).**

Sets forth one means that would be acceptable to the Administrator for approval of aircraft simulators or other training devices requiring approval under FAR 121.407.

**121–16 Maintenance Certification Procedures (11–9–70).**

Provides guidance for the preparation of an Operations Specification—Preface Page which will afford nominal and reasonable relief from approved service and overhaul time limits when a part is borrowed from another operator.

**121–17 Aviation Security: Certain Air Carriers and Commercial Operators—Security Programs and Other Requirements (3–14–72).**

Provides general information regarding the requirements of FAR Amdt. 121–85.

**121–18 Aviation Security—Carriage of Weapons and Escorted Persons (7–15–75).**

Provides information and guidance for the implementation of amendments to FAR Part 121 regarding the carriage of weapons on aircraft and for the carriage of persons in the custody of law enforcement officers.

**121–19 Aviation Security—Property Acceptance and Handling Procedures—Indirect Air Carriers (3–17–76).**

Provides information and guidance which may be used by "indirect air carriers" when providing property to be carried by "direct air carriers" or by the operator of any civil aircraft for transportation in air commerce.

**121–20 Aviation Security: Supplemental Air Carriers (3–17–76).**

Provides supplemental air carriers with information concerning recommended general security measures applicable to charter operations that should minimize the effects of crimes directed against air transportation.

**121–21 Information Guide for Training Programs and Manual Requirements in the Air Transportation of Hazardous Materials (7–30–76).**

Provides certificate holders under Parts 121 and 135 of the FARs with information relevant to recent amendment Docket HM–112 that incorporated FAR Part 103 into Title 49 of the CFR as Part 175. Outlines some of the substantive changes in the requirements for air transportation of hazardous materials.

**121–22 Maintenance Review Board (MRB) (1–12–77).**

Provides guidelines for establishing and conducting a MRB on newly manufactured aircraft, powerplant, or appliance to be used in air carrier service.

**121–23 Preparation and Loading of Magnetron Tubes and Magnetic Materials for Air Shipments (2–10–77).**

Provides information regarding the preparation and loading of magnetron tubes and magnetic materials for shipment in civil aircraft.

**121–24 Passenger Safety Information Briefing and Briefing Cards (6–23–77).**

Contains information and guidance material for use by air carriers in the preparation of passenger safety information briefings.

**121–25 Additional Weather Information: Domestic and Flag Air Carriers (9–16–77).**

Provides guidance and standards to domestic and flag air carriers for approval of a system for obtaining forecasts and reports of adverse weather phenomena.

**121.195(d)–1 Alternate Operational Landing Distances for Wet Runways; Turbojet Powered Transport Category Airplanes (11–19–65).**

Sets forth an acceptable means, but not the only means, by which the alternate provision of section 121.195(d) may be met.

**123–1 Air Travel Clubs (10–17–68).**

Sets forth guidelines and procedures to assist air travel clubs using large aircraft in meeting safety requirements of FAR Part 123.

**129–1 Foreign Air Carriers—Security Programs and Other Requirements—FAR Par 129 (9–25–75).**

Provides guidance to foreign air carriers concerning the requirements of FAR Part 129, Sections 129.25 and 129.27.

**133–1 Rotorcraft External-Load Operations in Accordance with FAR Part 133 (7–15–77).**

Provides information for persons interested in applying for a Rotorcraft External-Load Operator Certificate.

**135.144–1 Small Propeller-Driven Air Taxi Airplanes That Meet Section 135.144 (4–13–72).**

Provides a summary of and information on small propeller-driven air taxi airplanes that comply with section 135.144 and may continue operations under FAR Part 135 after May 31, 1972, with 10 or more passenger seats.

**135.155–1 Alternate Static Source for Altimeters and Airspeed and Vertical Speed Indicators (2–16–65).**

Sets forth an acceptable means of compliance with provision in FAR Part 135 and Part 23 dealing with alternate static courses.

**135–1C Air Taxi Aircraft Weight and Balance control (2–10–77).**

Provides the procedures for developing a weight and balance control system for small aircraft operating in the air taxi fleet under FAR Part 135.

**135–2A Air Taxi Operators of Large Aircraft (11–16–73).**

Provides guidelines for use by air taxi operators or applicants who desire to obtain authorization to operate large aircraft (more than 12,500 pounds maximum certificated takeoff weight) in air taxi operations.

**135–3A Air Taxi Operators and Commercial Operators of Small Aircraft (1–16–75).**

Sets forth guidelines and procedures to assist persons in complying with the requirements of Federal Aviation Regulations, Part 135.

**135–4A Aviation Security: Air Taxi Commercial Operators (ATCO) 4–15–76).**

Provides recommended security measures applicable to ATCO operations that should minimize the effects of crimes directed against air transportation.

**135–5A Maintenance Program Approval for Carry-On Oxygen Equipment for Medical Purposes (11–23–76).**

Provides a means whereby air taxi operators may submit a maintenance program to comply with FAR Part 135, Section 135.114.

**137–1 Agricultural Aircraft Operations (11–29–65).**

Explains and clarifies the requirements of FAR Part 137 and provides additional information, not regulatory in nature, which will assist interested persons in understanding the operating privileges and limitations of this Part.

**139.12–1 Airport Operations Specifications (2–3–75).**

Presents guidelines to assist airport operators in developing airport operations specifications in compliance with the requirements of amended FAR Part 139.

**139.49–1 Programs for Training of Fire Fighting and Rescue Personnel (11–12–74).**

Outlines suggested training programs for airport fire fighting and rescue personnel involved in operating airport fire fighting and rescue equipment and the principles of aircraft fire fighting and rescue techniques.

### Schools and Other Certificated Agencies

SUBJECT NO. 140

**140–1J Consolidated Listing of FAA Certificated Repair Stations (7–27–77).**

Provides a revised directory of all FAA certificated repair stations as of May 31, 1977.

**140–2K List of Certificated Pilot Schools (4–25–77).**

Provides a list of FAA certificated pilot flight and ground schools as of Nov. 1976.

**140–3B Approval of Pilot Training Courses Under Subpart D of Part 141 of the FAR (1–8–70).**

The title is self-explanatory.

**140–5 Radio Maintenance Technician School Curriculum (8–11–71).**

Provides information on curriculum subjects for persons desiring to establish radio maintenance technician training courses.

**141–1 Pilot School Certification (8–29–74).**

Sets forth guidelines to assist persons in obtaining a pilot school certificate and associated ratings under FAR Part 141 (revised).

**141–2A Written Tests Prepared by Pilot Schools With Examining Authority Under Part 141 (Revised) of the Federal Aviation Regulations (10–3–75).**

Provides guidance to FAR Part 141 Pilot Schools with examining authority in developing final written tests for FAA certificates and ratings which are equal in scope, depth, and difficulty to comparable written tests prescribed by the Administrator. Also prescribes procedures for administering, maintaining security of, and replacing those tests.

**143–1E Ground Instructor Written Test Guide–Basic & Advanced (1–24–77).**

Outlines the scope of basic knowledge requirements for a ground instructor; outlines source material to obtain this knowledge; presents a sample test with answers and explanations. ($2.00 Supt. Docs.) SN 050–007–00382–0.

**143–2C Ground Instructor—Instrument—Written Test Guide (1–30–76).**

Provides information to applicants for the instrument ground instructor rating about the subject areas covered in the examination and illustrated by a study outline, a list of study materials, and a sample examination with answers. ($1.40 Supt. Docs.) SN 050–007–00376–5.

**145–2 Repair Station Limited Ratings Beech 18 Series Aircraft (4–21–76).**

Advises of a required limited repair station rating to perform X-ray inspection of the Beech 18 wing and center section spar, and of the procedures for application.

**145.101–1A Application for Air Agency Certificate—Manufacturer's Maintenance Facility (3–10–69).**

Explains how to obtain a repair station certificate.

**147–2R Directory of FAA Certificated Aviation Maintenance Technician Schools (4–12–77).**

Provides a revised directory of all FAA certificated aviation maintenance technician schools as of Nov. 1976.

**147–3 Phase III, A National Study of the Aviation Mechanics Occupation (3–22–71).**

Announces the availability for purchase by the public of a reprint of a report of Phase III, A National Study of the Aviation Mechanics Occupation.

**147–4 Reports Availability of a Survey of Text Materials Used in Aviation Maintenance Technician Schools (9–3–74).**

Announces the public availability of the 1974 report on A Survey of Test Materials Used in Aviation Maintenance Technician Schools.

**149–2H Listing of Federal Aviation Administration Certificated Parachute Lofts (5–10–76).**

Provides a revised listing of all FAA certificated parachute lofts as of Jan. 31, 1976.

## Airports

SUBJECT NO. 150

AIRPORT PLANNING

**150/5000–1 Cancellation of Obsolete Publications Issued by Standards Division, Airports Service (4–17–70).**

Cancels outstanding airport engineering data sheets, technical standard orders, airport engineering bulletins, and miscellaneous publications that are no longer current and to direct the reader to a new source of information, where applicable.

**150/5000–3D Address List for Regional Airports Divisions and Airport District Offices (10–18–77).**

Transmits the address list for all regional Airports Divisions and Airport District Offices.

**150/5050–3A Planning the State Airport System (June 1972).**

Provides general guidance in preparing a State airport system plan. ($2.50 Supt. Docs.) SN 050–007–00184–3.

**150/5050–4 Citizen Participation in Airport Planning (9–26–75).**

Provides guidance for citizen involvement in airport planning. Although not mandatory for airport grant programs, it demonstrates the need for early citizen participation.

**150/5050–5 The Continuous Airport System Planning Process (11–28–75).**

The purpose of this advisory circular is to provide guidance on the Continuous Airport System Planning Process (CASPP). This process is utilized in establishing a planning capability to monitor and assess the effects of changes in the many variables and issues influencing a plan with the objective of maintaining a plan responsive to current and forecast conditions. In addition to describing the components of a CASPP, sponsor organizational structures and Federal financial participation in continuous planning activities are discussed.

**150/5060–1A Airport Capacity Criteria Used in Preparing the National Airport Plan (7–8–68).**

Presents the method used by the Federal Aviation Administration for determining when additional runways, taxiways, and aprons should be recommended in the National Airport Plan. The material is also useful to sponsors and engineers in developing Airport Layout Plans and for determining when additional airport pavement facilities should be provided to increase aircraft accommodation capacity at airports.

**150/5060–3A Airport Capacity Criteria Used in Long-Range Planning (12–24–69).**

Describes the method used by the Federal Aviation Administration for determining the approximate practical hourly and practical annual capacities of various airport runway configurations and is used in long-range (10 years or more) planning for expansion of existing airports and construction of new airports to accommodate forecast demand.

**150/5060–4 Announcement of Availability—Federal Aviation Administration Technical Reports on Airport Capacity and Aircraft Delay (4–29–77).**

Announces the availability of Federal Aviation Administration technical reports and computer programs describing techniques for determining airport capacity and aircraft delay. Provides ordering information.

**150/5070–3 Planning the Airport Industrial Park (9–30–65).**

Provides guidance to communities, airport boards, and industrial developers for the planning and development of Airport Industrial Parks.

**150/5070–5 Planning the Metropolitan Airport System (5–22–70).**

Gives guidance in developing airport-system plans for large metropolitan areas. It may be used by metropolitan planning agencies and their consultants in preparing such system plans and by the FAA in reviewing same. ($1.65 Supt. Docs.) SN 050–008–00003–7.

**150/5070–6 Airport Master Plans (2–5–71).**

Provides guidance for the preparation of individual airport master plans as provided for under the Airport Airway Development Act of 1970. ($3.00 Supt. Docs.) SN 050–008–00004–5.

**150/5090–2 National Airport Classification System (Airport System Planning) (6–25–71).**

Sets forth the new national airport classification system. The system is designed for use in the identification and classification of airports within the National System of Airports and for use as a planning tool in long-range airport system planning.

FEDERAL-AID AIRPORT PROGRAMS

**150/5100–3A Federal-aid Airport Program-Procedures Guide for Sponsors (9–20–68).**

Provides guidance to public agencies that sponsor or propose to sponsor projects under the Federal-aid Airport Program (FAAP) authorized by the Federal Airport Act.

**150/5100–3A CH I (11–28–69).**

Transmits revised pages to subject advisory circular.

**150/5100–6A Labor Requirements for Airport Development Aid Program (ADAP) Contracts (1–31–73).**

Covers the basic labor requirements for the Airport Development Aid Program.

**150/5100–6A CH 1 (3–16–73).**

Transmits a revision to delete page 3–1 from subject Advisory Circular.

**150/5100–7A Requirement for Public Hearing in the Airport Development Aid Program (2–25–72).**

Provides guidance to sponsors of airport development projects under the Airport Development Aid Program (ADAP) on the necessity for and conduct of public hearings.

**150/5100–8 Request for Aid; Displaced Persons; Public Hearings; Environmental Considerations; Opposition to the Project (1–19–71).**

Provides general guidance on the information and coordination required in support of a request for aid for an airport development project under the Airport and Airway Development Act of 1970.

**150/5100–9 Engineering Services Under the Airport Development Aid Program (ADAP) (7–1–72). Consolidated reprint March 1977 includes Change 1.**

Provides guidance for airport sponsors and Federal Aviation Administration offices in the definition, selection, review, and approval of engineering services used under subject program.

**150/5100–10A Accounting Records Guide for Airport Aid Program Sponsors (4–13–76).**

This advisory circular sets forth recordkeeping requirements imposed on sponsors of Airport Development Aid Program (ADAP) and the Planning Grant Program (PGP) projects by the Airport and Airway Development Act of 1970, as amended. In addition, the Federal Aviation Regulations (FARs) require a sponsor to establish and maintain a financial management system that meets the standards set forth in FAR 152, Appendix K. This circular provides detailed explanations of these requirements.

**150/5100–11 Land Acquisition and Relocation Assistance Under the Airport Development Aid Program (2–10–75).**

Provides guidance to sponsors of airport development projects under the Airport Development Aid Program to meet the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (Public Law 91–646).

**150/5100–12 Electronic Navigational Aids Approved for Funding Under the Airport Development Aid Program (9–20–76).**

Provides a list of the electronic navigational aids equipment which are approved for funding under the ADAP.

**150/5100–13 Development of State Standards for General Aviation Airports (3–1–77).**

Provides guidelines and programming procedures for the development of state standards for general aviation airports as provided for in the Airport and Airway Development Act Amendments of 1976.

SURPLUS AIRPORT PROPERTY CONVEYANCE PROGRAMS

**150/5150–2A Federal Surplus Personal Property for Public Airport Purposes (8–3–73).**

Acquaints public airport owners and other interested parties with the Federal Surplus Personal Property Program for public airports and to outline procedures to be used in applying for and acquiring surplus personal property for this purpose.

**150/5150–2A CH I (2–21–74).**

Adds material to paragraph 24, Chapter 6, which was inadvertently omitted in the Advisory Circular during preparation.

AIRPORT COMPLIANCE PROGRAM

**150/5190–1 Minimum Standards for Commercial Aeronautical Activities on Public Airports (8–18–66).**

Gives to owners of public airports information helpful in the development and application of minimum standards for commercial aeronautical activities.

**150/5190–2A Exclusive Rights at Airports (4–4–72).**

Makes available to public airport owners, and to other interested persons, basic information and guidance on FAA's policy regarding exclusive rights at public airports on which Federal funds, administered by FAA, have been expended.

**150/5190–2A CH 1 (10–2–72).**

Deletes the reference to the sale of aeronautical charts by the National Ocean Survey (formerly the U.S. Coast and Geodetic Survey) and to encourage airport owners to obtain UNICOM license in their own names and make these facilities available to all fixed base operators.

**150/5190–4 A Model Zoning Ordinance to Limit Height of Objects Around Airports (8–23–77).**

Provides a model zoning ordinance to be used as a guide to control the height of objects around airports.

AIRPORT SAFETY—GENERAL

**150/5200–3A Bird Hazards to Aircraft (3–2–72).**

Transmits to the aviation public the latest published information concerning the reduction of bird strike hazards to aircraft in flight and in the vicinity of airports.

**150/5200–4 Foaming of Runways (12–21–66).**

Discusses runway foaming and suggests procedures for providing this service.

**150/5200–5 Considerations for the Improvement of Airport Safety (2–2–67).**

Emphasizes that, in the interest of accident/incident prevention, airport management should conduct self-evaluations and operational safety inspections. An exchange of information and suggestions for the improvement of airport safety is also suggested.

**150/5200–6A Security of Aircraft at Airports (6–28–68).**

Directs attention to the problem of pilferage from aircraft on airports and suggests action to reduce pilferage and the hazards that may result therefrom.

**150/5200–7 Safety on Airports During Maintenance of Runway Lighting (1–24–68).**

Points out the possibility of an accident occurring to airport employees caused by electrocution.

**150/5200–8 Use of Chemical Controls to Repel Flocks of Birds at Airports (5–2–68).**

Acquaints airport operators with new recommendations on the use of chemical methods for dispersing flocks of birds.

**150/5200–9 Bird Reactions and Scaring Devices (6–26–68).**

Transmits a report on bird species and their responses and reactions to scaring devices.

**150/5200–11 Airport Terminals and the Physically Handicapped (11–27–68).**

Discusses the problems of the physically handicapped air traveler and suggests features that can be incorporated in modification or new construction of airport terminal buildings.

**150/5200–12 Fire Department Responsibility in Protecting Evidence at the Scene of an Aircraft Accident (8–7–69).**

Furnishes general guidance for employees of airport management and other personnel responsible for firefighting and rescue operations, at the scene of an aircraft accident, on the proper presentation of evidence.

**150/5200–13 Removal of Disabled Aircraft (8–27–70).**

Discusses the responsibility for disabled aircraft removal and emphasizes the need for prearranged agreements, plans, equipment, and improved coordination for the expeditious removal of disabled aircraft from airport operating

areas. It also illustrates some of the various methods used, equipment employed, equipment available, and concepts for aircraft recovery.

**150/5200–14 Results of 90-Day Trial Exercise on Fire Department Activity (9–8–70).**

Transmits statistical data collected during a 90-day trial exercise conducted to determine the relationship between aircraft fire and rescue service activities and airport aeronautical operations.

**150/5200–15A Availability of the International Fire Service Training Association's (IFSTA) Aircraft Fire Protection and Rescue Procedures Manual (5–4–77).**

Announces the availability of the subject manual.

**150/5200–16 Announcement of Report AS–71–1 "Minimum Needs for Airport Fire Fighting and Rescue Services" Dated January 1971 (4–13–71).**

Announces the availability of the subject report and describes how to get it.

**150/5200–17 Emergency Plan (2–5–72).**

Contains guidance material for airport management to use in developing an emergency plan at civil airports.

**150/5200–17 CH–1 (6–28–74).**

Provides additional guidance on care and services for uninjured aircraft passengers.

**150/5200–18 Airport Safety Self-Inspection (2–5–72).**

Suggests functional responsibility, procedures, a checklist, and schedule for an airport safety self-inspection.

**150/5200–19 Availability of Report No. FAA–RD–71–20 "An Analysis of Airport Snow Removal and Ice Control" dated March 1971 (11–23–71).**

Announces the availability of subject report.

**150/5200–21 Announcing the Availability of U.S. Air Force Technical Order (T.O. 00–105–9) Aircraft Emergency Rescue Information (5–23–73).**

Explains the nature of the Technical Order and tells how it can be obtained by airport fire departments which are under the Airport Certification Program.

**150/5200–22 Announcing the Availability of the International Civil Aviation Organization Airport Services Manual, DOC–9137–AN/898, Part 3, Bird Control and Reduction (3–16–76).**

Announces the availability of the manual, explains its purpose, and tells how to obtain copies.

**150/5200–23 Airport Snow and Ice Control (11–1–76).**

Provides guidance to assist airport owners/operators to establish or improve airport snow and ice control programs.

**150/5210–2 Airport Emergency Medical Facilities and Services (9–3–64).**

Provides information and advice so that airports may take specific voluntary preplanning actions to assure at least minimum first-aid and medical readiness appropriate to the size of the airport in terms of permanent and transient personnel.

**150/5210–5 Painting, Marking, and Lighting of Vehicles Used on an Airport (8–31–66).**

Makes recommendations concerning safety, efficiency, and uniformity in the interest of vehicles used on the aircraft operational area of an airport.

**150/5210–6B Aircraft Fire and Rescue Facilities and Extinguishing Agents (1–26–73).**

Outlines scales of protection considered as the recommended level compared with the minimum level in Federal Aviation Regulation Part 139.49 and tells how these levels were established from test and experience data.

**150/5210–6B CH 1 (8–22–73).**

Issues new guidance under paragraph 9, and paragraph 12 of subject advisory circular.

**150/5210–6B CH 2 (5–21–74).**

Includes details on the basic purpose, care, and cleaning of proximity suits. Adds a new chapter 5—contains criteria intended for use in purchasing off-the-shelf design proximity suits.

**150/5210–7A Aircraft Fire and Rescue Communications (3–16–72).**

Provides guidance information for use by airport management in establishing communication and alarm facilities by which personnel required to respond to and function at aircraft ground emergencies may be alerted and supplied with necessary information.

**150/5210–8 Aircraft Firefighting and Rescue Personnel and Personnel Clothing (1–13–67).**

Provides guidance concerning the manning of aircraft fire and rescue trucks, the physical qualifications that personnel assigned to these trucks should meet, and the protective clothing with which they should be equipped.

**150/5210–9 Airport Fire Department Operating Procedures During Periods of Low Visibility (10–27–67).**

Suggests training criteria which airport management may use in developing minimum response times for aircraft fire and rescue trucks during periods of low visibility.

**150/5210–10 Airport Fire and Rescue Equipment Building Guide (12–7–67).**

This title is self-explanatory.

**150/5210–11 Response to Aircraft Emergencies (4–15–69).**

Informs airport operators and others of an existing need for reducing aircraft firefighting response time, and outlines a uniform response time goal of 2 minutes within aircraft operational areas on airports.

**150/5210–12 Fire and Rescue Service for Certificated Airports (3–2–72).**

Furnishes guidance and explains to Federal Aviation Administration (FAA) airport inspectors and airport management the minimum criteria to be applied when evaluating the aircraft fire and rescue service required at an airport for its compliance with the requirements of FAR Part 139.

**150/5210–13 Water Rescue Plans, Facilities, and Equipment (5–1–72).**

Suggests planning procedures facilities, and equipment to effectively perform rescue operations when an aircraft lands in a body of water, swamp, or tidal area where normal aircraft firefighting and rescue service vehicles are unable to reach the accident scene.

**150/5220–1 Guide Specification for a Light-Weight Airport Fire and Rescue Truck (7–24–64).**

Describes a vehicle with performance capabilities considered as minimum for an acceptable light rescue truck.

**150/5220–4 Water Supply Systems for Aircraft Fire and Rescue Protection (12–7–67).**

The title is self-explanatory.

**150/5220–6 Guide Specification for 1,000-Gallon Tank Truck (4–10–68).**

Assists airport management in the development of local procurement specifications.

**150/5220–9 Aircraft Arresting System for Joint Civil/Military Airports (4–6–70).**

Updates existing policy and describes and illustrates the various types of military aircraft emergency arresting systems that are now installed at various joint civil/military airports. It also informs users of criteria concerning installations of such systems at joint civil/military airports.

**150/5220–10 Guide Specification for Water/Foam Type Aircraft Fire and Rescue Trucks (5–26–72).**

Assists airport management in the development of local procurement specifications.

**150/5220–10 CH 1 (12–4–72).**

Replaces information on weight distribution and fire pump engines which was omitted when the subject circular was developed, consolidating information from four other circulars.

**150/5220–10 CH 2 (8–22–73).**

Expands the guidance under paragraph 14 of subject AC to permit the design of engine systems to operate in freezing temperatures for prolonged periods and to provide devices insulation materials, etc., to prevent the truck fire fighting system from freezing.

**150/5230–3 Fire Prevention During Aircraft Fueling Operations (4–8–69).**

This advisory circular provides information on fire preventive measures which aircraft servicing personnel should observe during fueling operations.

**150/5240–7 A Fuel/Energy Conservation Guide for Airport Operators (2–19–74).**

Identifies potential areas where fuel and energy usage can be conserved to assist airport operators in their voluntary actions in reducing fuel and energy consumption.

**150/5280–1 Airport Operations Manual (6–16–72).**

Sets forth guidelines to assist airport operators in developing an Airport Operations Manual in compliance with the requirements of FAR Part 139.

**150/5280–3 Fire Fighting Exemptions Under the 1976 Amendment to the Federal Aviation Act (2–4–77).**

Outlines the type of information that may be used as justification in supporting petitions for exemption from a portion or all of the fire fighting and rescue requirements of Part 139.

DESIGN, CONSTRUCTION, AND MAINTENANCE—GENERAL

**150/5300–2C Airport Designs Standards—Site Requirements for Terminal Navigational Facilities (9–21–73). Consolidated reprint 1976 includes Change 1.**

Provides information regarding the relative location and siting requirements for the terminal navigation facilities located on or close to an airport.

**150/5300–4B Utility Airports—Air Access to National Transportation (6–24–75).**

Establishes design standards for utility airports which are constructed for and intended to be used by propeller-driven aircraft of 12,500 pounds maximum gross weight or less.

**150/5300–4B CH 1 (8–24–76).**

**150/5300–5 Airport Reference Point (9–26–68).**

Defines and presents the method for calculating an airport reference point.

**150/5300–6 Airport Design Standards, General Aviation Airports, Basic and General Transport (7–14–69). Consolidated Reprint August 1975 Incorporates Changes 1 and 2.**

Provides recommended design criteria for the development of larger than general utility airports.

**150/5300–7B FAA Policy on Facility Relocations Occasioned by Airport Improvements or Changes (11–8–72).**

Reaffirms the aviation community of the FAA policy governing responsibility for funding relocation, replacement and modification to air traffic control and air navigation facilities that are made necessary by improvements or changes to the airport.

**150/5300–8 Planning and Design Criteria for Metropolitan STOL Ports (11–5–70).**

Provides the criteria recommended for the planning and design of STOL ports in metropolitan areas.

**150/5300–8 CH 1 (4–3–75).**

Transmits revised requirements for color coding of threshold and runway end lights on STOL runways.

**150/5300–9 Predesign and Preconstruction Conferences (ADAP) Projects (9–10–73).**

Emphasizes the need for, and encourages the use of, predesign and preconstruction conferences as valuable tools in the administration of construction contracts funded under the ADAP.

**150/5300–10 Federal Aviation Administration Funded Study—Analysis of General Aviation Airports Developed With and Without Federal Financial Assistance (7–21–75).**

Transmits the recommendations and conclusions of a study conducted for the FAA. Advises the public as to how they may obtain the reports.

**150/5320–5B Airport Drainage (7–1–70).**

Provides guidance for engineers, airport managers, and the public in the design and maintenance of airport drainage systems. ($1.30 Supt. Docs.) SN 050–007–00149–5.

**150/5320–6B Airport Pavement Design and Evaluation (5–28–74). Consolidated reprint 1976 includes change 1.**

Provides guidance to the public for the design and evaluation of pavements at civil airports.

**150/5320–10 Environmental Enhancement at Airports—Industrial Waste Treatment (4–16–73).**

Provides basic information on the nature and treatment of industrial wastes produced at airports.

**150/5320–10 CH 1 (11–18–74).**

**150/5320–11 Runway Categorization—Aeronautical Studies—Airport Owners' Responsibilities (9–21–73).**

Emphasizes the need for airport owners to maintain runway and approach zone categories and locations on file with FAA so they may be given consideration under the regulations of FAR Part 77.

**150/5320–12 Methods for the Design, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces (6–30–75).**

Provides guidance on methods that can be used to provide and maintain airport pavement surface friction characteristics.

**150/5325–2C Airport Design Standards—Airports Served by Air Carriers—Surface Gradient and Line-of-Sight (2–6–75). Consolidated reprint 1975 includes Change 1.**

Establishes design standards for airports served by certificated air carriers to assist engineers in (1) designing the gradients of airports surface areas used to accommodate the landing, takeoff, and other ground movement requirement of airplanes while (2) providing adequate line of sight between airplanes operating on airports.

**150/5325–3 Background Information on the Aircraft Performance Curves for Large Airplanes (1–26–65). Consolidated Reprint May 1974. Includes Change 1.**

Provides airport designers with information on aircraft performance curves for design which will assist them in an objective interpretation of the data used for runway length determination.

**150/5325–4 Runway Length Requirements for Airport Design (4–5–65). Consolidated Reprint 1977 Includes Changes 1 through 11.**

Presents aircraft performance curves and sets forth standards for the determination of runway lengths to be provided at airports. The use of these standards is required for project activity under the Federal-Aid Airport Program when a specific critical aircraft is considered as the basis for the design of a runway.

**150/5325–4 CH 12 (7–27–77).**

**150/5325–5B Aircraft Data (7–30–75). Consolidated reprint 1976 includes Change 1.**

Presents a listing of principal dimensions of aircraft affecting airport design for guidance in airport development.

**150/5325–6A Airport Design Standards—Effects and Treatment of Jet Blast (7–13–72).**

Presents criteria on the jet engine blast velocities associated with aircraft in common use in air carrier service, the effects of these blast velocities during ground operations, and suggested means to counteract or minimize these effects.

**150/5325–8 Compass Calibration Pad (5–8–69).**

Provides guidelines for the design, location on the airport, and construction of a compass calibration pad, and basic information concerning its use in determining the deviation error in an aircraft magnetic compass.

**150/5335–1A Airport Design Standards—Airports Served by Air Carriers—Taxiways (5–15–70). Consolidated reprint 1976 includes Change 1.**

Provides criteria on taxiway design for airports served by certificated route air carriers with present airplanes and those anticipated in the near future.

**150/5335–1A CH 2 (12–29–76).**

Transmits revised pages to the subject advisory circular.

**150/5335–2 Aiport Aprons (1–27–65).**

Provides the criteria for airport aprons which are acceptable in accomplishing a project meeting the eligibility requirements of the Federal-aid Airport Program.

**150/5335–3 Airport Design Standards—Airports Served by Air Carriers—Bridges and Tunnels on Airports (4–19–71). Consolidated reprint June 1977 includes Change 1.**

Provides general guidance to those contemplating the construction of a bridge-type structure to allow aircraft to cross over an essential surface transportation mode.

**150/5335–4 Airport Design Standards—Airports Served by Air Carriers—Runway Geometrics (7–21–75).**

Provides criteria on runway geometric design for airports served by certificated route air carriers.

**150/5335–4 Ch 1 (6–14–76).**

**150/5340–1D Marking of Paved Areas on Airports (1–19–73).**

Describes standards for marking serviceable runways and taxiways as well as deceptive, closed, and hazardous areas on airports.

**150/5340–4C Installation Details for Runway Centerline and Touchdown Zone Lighting Systems (5–6–75). Consolidated March 1977 includes Change 1.**

Describes standards for the design and installation of runway centerline and touchdown zone lighting systems.

**150/5340–5A Segmented Circle Airport Marker System (9–10–71).**

Sets forth standards for a system of airport marking consisting of certain pilot aids and traffic control devices.

**150/5340–14B Economy Approach Lighting Aids (6–19–70). Consolidated reprint March 1977 includes Changes 1 and 2.**

Describes standards for the design, selection, sitting, and maintenance of economy approach lighting aids.

**150/5340–17A Standby Power for Non-FAA Airport Lighting Systems (3–19–71).**

Describes standards for the design, installation, and maintenance of standby power for nonagency owned airport visual aids associated with the National Airspace System (NAS).

**150/5340–18 Taxiway Guidance System (9–27–68).**

Describes the recommended standards for design, installation, and maintenance of a taxiway guidance sign system.

**150/5340–19 Taxiway Centerline Lighting System (11–14–68).**

Describes the recommended standards for design, installation, and maintenance of a taxiway centerline lighting system.

**150/5340–20 Installation Details and Maintenance Standards for Reflective Markers for Airport Runway and Taxiway Centerlines (2–17–69).**

Describes standards for the installation and maintenance of reflective markers for airport runway and taxiway centerlines.

**150/5340–21 Airport Miscellaneous Lighting Visual Aids (3–25–71).**

Describes standards for the system design, installation, inspection, testing, and maintenance of airport miscellaneous visual aids; i.e., airport beacons, beacon towers, wind cones, wind tees, and obstruction lights.

**150/5340–22 Maintenance Guide for Determining Degradation and Cleaning of Centerline and Touchdown Zone Lights (4–20–71). Consolidated reprint August 1977 includes Change 1.**

Contains maintenance recommendations for determining degradation and cleaning of centerline and touchdown zone lights installed in airport pavement.

**150/5340–23A Supplemental Wind Cones (6–24–75).**

Describes standards for the performance and location of supplemental wind cones.

**150/5340–24 Runway and Taxiway Edge Lighting System (9–3–75).**

Describes standards for the design, installation, and maintenance of runway and taxiway edge lighting.

**150/5340–25 Visual Approach Slope Indicator (VASI) Systems (9–24–76).**

Describes standards for the design, installation, and maintenance of visual approach slope indicator systems.

**150/5340–25 CH 1 (5–3–77).**

Transmits page changes to subject advisory circular.

**150/5340–27 AIR-to-Ground Radio Control of Airport Lighting Systems (8–10–77).**

Describes operating criteria for air-to-ground radio control of airport lighting systems.

**150/5345-1E Approved Airport Lighting Equipment (9–9–76).**

Contains lists of approved airport lighting equipment and manufacturers qualified to supply their product in accordance with the indicated specification requirements.

**150/5345–1E CH 1 (3–23–77).**

Adds additional equipment and manufacturers to the approved list.

**150/5345–1E CH 2 (9–8–77).**

**150/5345–2 Specification for L–810 Obstruction Light (11–4–63). Consolidated reprint June 1977 includes change 1.**

Required for FAAP project activity.

**150/5345–3C Specification for L–821 Panels for Remote Control of Airport Lighting (3–30–77).**

Describes the specification requirements for an airport lighting control panel for the remote control of airport lighting circuits and is published by the Federal Aviation Administration for the guidance of the public.

**150/5345–4 Specification for L–829 Internally Lighted Airport Taxi Guidance Sign (10–15–63). Consolidated reprint June 1977 includes Change 1.**

Required for FAAP project activity.

**150/5345–5 Specification for L–847 Circuit Selector Switch, 5,000 Volt 20 Ampere (9–3–63).**

Required for FAAP project activity.

**150/5345–7C Specification for L–824 Underground Electrical Cable for Airport Lighting Circuits (2–4–76).**

Describes the specification requirements for underground electrical cables for airport lighting circuits. Published by the FAA for the guidance of the public.

**150/5345–10C Specification for L–828 Constant Current Regulators (10–22–71).**

Describes the subject specification requirements and is published by the Federal Aviation Administration for the guidance of the public.

**150/5345–11 Specification for L–812 Static Indoor Type Constant Current Regulator Assembly, 4 Kw and 7½ Kw, With Brightness Control for Remote Operations (3–2–64).**

Required for FAAP project activity.

**150/5345–12B Specification for L–801 Beacon (9–8–77).**

Describes the subject specification requirements.

**150/5345–13 Specification for L–841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits (1–6–64).**

Required for FAAP project activity.

**150/5345–18 Specification for L–811 Static Indoor Type Constant Current Regulator Assembly, 4 Kw; With Brightness Control and Runway Selection for Direct Operation (3–3–64). Consolidated reprint Sept. 1974 includes Change 1.**

Required for FAAP project activity.

**150/5345–21 Specification for L813 Static Indoor Type Constant Current Regulator Assembly; 4 Kw and 7½ Kw; for Remote Operation of Taxiway Lights (7–28–64).**

Describes the subject specification requirements.

**150/5345–26A Specification for L–823 Plug and Receptacle, Cable Connectors (5–4–71). Consolidated reprint June 1977 includes change 1.**

Describes the subject specification requirements.

**150/5345–27A Specification for L–807 Eight-foot and Twelve-foot Unlighted or Externally Lighted Wind Cone Assemblies (6–16–69).**

Describes the subject specification requirement for a hinged steel pole support, an anodized tapered aluminum hinged base pole support, and an "A" frame fixed support with a pivoted center pipe support.

**150/5345–28C Specification for L–851 Visual Approach Slope Indicators and Accessories (3–23–77).**

Describes the specification requirements for visual approach slope indicator (VASI) and simple abbreviated visual approach slope indicator (SAVASI) equipment and accessories.

**150/5345–36 Specification for L–808 Lighted Wind Tee (2–3–65).**

Describes the subject specification requirements.

**150/5345–39A FAA Specification L–853, Runway and Taxiway Centerline Retroreflective Markers (9–17–71).**

Describes specification requirements for L–853 Runway and Taxiway Retroreflective markers, for the guidance of the public.

**150/5345–42A FAA Specification L–857, Airport Light Bases, Transformer Housings and Junction Boxes (10–1–73).**

Describes specification requirements for airport light bases, transformer housing and junction boxes for the guidance of the public.

**150/5345–42A Ch 1 (11–14–75).**

**150/5345–43B FAA/DOD Specification L–856, High Intensity Obstruction Lighting Systems (11–1–73).**

Contains equipment specifications for high intensity obstruction lighting systems.

**150/5345–44A Specification for L–858, Retroreflective Taxiway Guidance Signs (7–20–71).**

Describes the specification for retroreflective taxiway guidance signs.

**150/5345–45 Lightweight Approach Light Structure (5–10–73).**

Presents the specifications for lightweight structures for supporting lights as used in visual navigational aid systems.

**150/5345–46 Specification for Semiflush Airport Lights (7–11–75).**

Establishes the performance requirements and pertinent construction details for omnidirectional, unidirectional, and bidirectional semiflush inset light assemblies to be used for lighting airport runways and taxiways.

**150/5345–46 Ch 1 (9–9–75).**

**AC 150/5345–46 Ch 1 Errata Sheet (11–20–75).**

**150/5345–47 Isolation Transformers for Airport Lighting Systems (7–28–75).**

Contains the specifications requirements for series-to-series isolation transformers for use in airport lighting systems.

**150/5345–48 Specification for Runway and Taxiway Edge Lights (8–1–75).**

Contains the specification requirements for airport runway and taxiway edge lights for the guidance of the public.

**150/5345–48 Ch 1 (7–13–76).**

**150/5345–49 Specification L–854, Radio Control Equipment (5–20–77).**

Contains the specification for radio control equipment to be used for controlling airport lighting facilities.

**150/5355–1A International Signs to Facilitate Passengers Using Airports (11–3–71).**

Informs airport authorities of the desirability to provide international signs and diagrammatic maps within terminal buildings and of the need for clearly marked road signs for airports.

**150/5355–2 Fallout Shelters in Terminal Buildings (4–1–69).**

Furnishes guidance for the planning and design of fallout shelters in airport terminal buildings.

**150/5360–2 Airport Cargo Facilities (4–6–64).**

Provides guidance material on air cargo facilities.

**150/5360–4A Guidelines for Federal Inspection Services Facilities at International Airports of Entry and at Landing Rights Airports (10–7–77).**

Announces the availability a booklet containing more current information on the requirements for Federal Inspection Services at airports of entry and at landing rights airports.

**150/5360–5 Announcement of Availability of the International Civil Aviation Organizaton (ICAO) Computer Data Bank Material (8–13–76).**

Announces the availability of computer data bank material on airports shown in the International Civil Aviation Organization (ICAO) Regional Air Navigation Plans and how it can be obtained.

**150/5360–6 Airport Terminal Building Development with Federal Participation (10–5–76).**

Provides guidance pertaining to Federal participation in airport terminal building construction under the provisions of the Airport and Airway Development Act, as amended.

**150/5360–7 Planning and Design Consideration for Airport Terminal Building Development (9–5–76).**

Presents planning and design procedures to be considered in airport terminal building development funded under the Airport and Airway Development Act, as amended.

**150/5360–8 Announcement of Availability of Information on Foreign Airport Planning, Design, Construction, and Trade Opportunities (9–24–76).**

Provides information on the availability of the U.S. Dept. of Commerce Foreign Trade Opportunities Program and on publications issued on foreign airport planning, design, construction, and trade opportunities.

**150/5370–2A Operational Safety on Airports With Emphasis on Safety During Construction (6–20–75).**

Presents guidelines concerning operational safety on airports with special emphasis on safety during periods of construction activity.

**150/5370–2A CH 1 (8–2–76).**

**150/5370–4 Procedures Guide for Using the Standard Specifications for Construction of Airports (5–29–69).**

Provides guidance to the public in the use and application of the Standard Specifications for Construction of Airports.

**150/5370–5A Offshore Airports (2–21–75).**

Announces to the public the availability of a two-volume report on offshore airport planning and construction methods and how to obtain the report.

**150/5370–6 Construction Progress and Inspection Report—Federal-Aid Airport Program (3–16–70).**

Provides for a report on construction progress and inspection of Federal-aid Airport Program (FAAP) projects, suggests a form for the report, and recommends use of the form unless other arrangements exist to obtain the type of information provided by the form.

**150/5370–7 Airport Construction Controls To Prevent Air and Water Pollution (4–26–71).**

Supplies guidance material on compliance with air and water standards during construction of airports developed under the Airport and Airway Development Act of 1970.

**150/5370–9 Slip-Form Paving—Portland Cement Concrete (6–7–73).**

Transmits guidance for the construction of Portland Cement Concrete pavements by the slip-form method.

**150/5370–10 Standards for Specifying Construction of Airports (10–24–74).**

Provides construction standards usually used to specify grading, drainage, paving, lighting, fencing, and turfing items of work on civil airports. ($7.25 Supt. Docs.) SN 050–007–00264–5.

**150/5370–10 CH 1 (5–31–77).**

**150/5370–11 Use of Nondestructive Testing Devices in the Evaluation of Airport Pavements (6–4–76).**

Provides guidance to the public on the use of nondestructive testing devices as aids in the evaluation of the load-carrying capacity of airport pavements.

**150/5380–4 Ramp Operations During Periods of Snow and Ice Accumulation (9–11–68).**

Directs attention to an increased accident potential when snow or ice accumulates on the surfaces of ramps and aircraft parking and holding areas and suggests some measures to reduce this potential.

**150/5380–5 Debris Hazards at Civil Airports (3–8–71).**

Discusses problems of debris at airports, gives information on foreign objects, and tells how to eliminate such objects from operational areas.

**150/5390–1B Heliport Design Guide (8–22–77).**

Contains design guidance material for the development of heliports, both surface and elevated.

PLANNING GRANT PROGRAM

**150/5900–1A The Planning Grant Program for Airports (9–26–74).**

Offers guidance to the sponsors of airport system plans and airport master plans on how to participate in the FAA's Planning Grant Program. It describes the application process and the administrative procedures to be followed in performing planning projects.

### Air Navigational Facilities

SUBJECT NO. 170

**170–3B Distance Measuring Equipment (DME) (11–8–65).**

Presents information on DME and some of its uses to pilots unfamiliar with this navigational aid.

**170–6A Use of Radio Navigation Test Generators (3–30–66).**

Gives information received from the Federal Communications Commission as to the frequencies on which the FCC will license test generators (used to radiate a radio navigation signal) within the scope of its regulations and gives additional information to assist the user when checking aircraft navigation receivers.

**170–8 Use of Common Frequencies for Instrument Landing Systems Located on Opposite Ends of the Same Runway (11–7–66).**

In the future, common frequencies may be assigned to like components of two instrument landing systems serving opposite ends of the same runway. This will include the localizers, glide slopes, and associated outer and middle marker compass locators (LOM and LMM).

**170–9 Criteria for Acceptance of Ownership and Servicing of Civil Aviation Interest(s) Navigational and Air Traffic Control Systems and Equipment (11–26–68).**

Contains a revised FAA policy under which the FAA accepts conditional ownership of equipment and systems from civil aviation interests, without the use of Federal funds, and operates, maintains, and provides the logistic support of such equipment.

**170–10 FAA Recommendations to FCC on Licensing of Non-Federal Radio Navigation Aids (10–17–69).**

Gives background information and describes the basis for recommendations to be made by the FAA to the Federal Communications Commission (FCC) regarding licensing of radio navigation aids.

**170–11 Amendment of Federal Aviation Regulation Part 171 (FAR–171)—Cost of Flight and Ground Inspections (9–17–70).**

Alerts the public to the amendment to FAR Part 171 pertaining to the payment of ground and flight inspection charges prior to the issuance of an approved IFR procedure.

**170–12 Implementatoin of 50 KHz/Y Channels for ILS/VOR/DME (10–7–70).**

Advises aircraft owners, operators and radio equipment manufacturers of plans for future implementation of split channel assignments in the aeronautical radio navigation bands.

### Administrative

SUBJECT NO. 180

**183–30B FAA Designated Mechanic Examiners Directory (5–10–76).**

Provides a revised directory of all FAA designated mechanic examiners as of Jan. 31, 1976.

**183–31C FAA Designated Parachute Rigger Examiner Directory (5–10–76).**

Provides a new directory of all FAA designated parachute rigger examiners as of Jan. 31, 1976.

**183.29–1K Designated Engineering Representatives (7–1–77).**

Lists FAA-approved Designated Engineering Representatives who are available for consulting work.

### Flight Information

SUBJECT NO. 210

**210–1A National Notice to Airmen System (12–10–75).**

Announces FAA policy for the preparation and issuance of essential flight information to pilots and other aviation interests.

**210–3 National Notice to Airmen System—Elimination of NOTAM Code (5–22–70).**

Announces changes in criteria and procedures for the Notice to Airmen System required to accommodate the transmission of all domestic Notice to Airmen data in clear contracted language and eliminate use of the NOTAM code on the domestic service A circuits.

**210–4 National Notice to Airmen (NOTAM) System Handbook (3–3–77).**

Announces the establishment of criteria for originating, preparing, and disseminating changes to essential flight information to pilots and other aviation interests as established by FAA Order 7930.1A.

**210–4 National Notice to Airmen (NOTAM) System Handbook ADDENDUM.**

Corrects contents pages.

**210–5 Military Flying Activities (9–23–77).**

Presents information about military flying activities in the National Airspace System, describes the various types of routes and areas allocated for this purpose, and explains how information on the location and status of these routes and areas can be obtained.

**211–2 Recommended Standards for IFR Aeronautical Charts (3–20–67).**

Sets forth standards recommended by the Federal Aviation Administration for the guidance of the public in the issuance of IFR aeronautical charts for use in the National Airspace System (NAS).

### Advisory Circulars For Sale

This List contains those circulars that are sold by the Superintendent of Documents. (See numerical index for appropriate price, sequential lettering, if any, and date, etc.)

Acceptable Methods, Techniques, and Practices—Aircraft Alterations, AC 43.13–2.
Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair, AC 43.13–1.
Aircraft Dispatcher Written Test Guide, AC 65–4.
Airframe and Powerplant Mechanics Airframe Handbook, AC 65–15.
Airframe and Powerplant Mechanics Certification Guide, AC 65–2.
Airframe and Powerplant Mechanics Certification Information, AC 65–11.
Airframe and Powerplant Mechanics—General Handbook, AC 65–9.
Airframe and Powerplant Mechanics Powerplant Handbook, AC 65–12.
Airline Transport Pilot—Airplane—Practical Test Guide (Part 61 Revised), AC 61–77.
Airline Transport Pilot (Airplane) Written Test Guide, AC 61–18.
Airline Transport Pilot (Helicopter) Written Test Guide, AC 61–42.
Airport Drainage, AC 150/5320–5.
Airport Master Plans, AC 150/5070–6.
Aviation Instructors Handbook, AC 60–14.
Aviation Weather, AC 00–6.
Aviation Weather Services, AC 00–45.
Basic Glider Criteria Handbook, AC 21–3.
Basic Helicopter Handbook, AC 61–13.
Commercial Pilot Airplane Flight Test Guide, AC 61–55.
Commercial Pilot Airplane Written Test Guide, AC 61–71.
Federal Aviation Regulations Written Test Guide for Private, Commercial, and Military Pilots, AC 61–34.
Flight Engineer Written Test Guide, AC 63–1.
Flight Instructor Instrument—Airplane—Written Test Guide, AC 61–70.
Flight Instructor Practical Test Guide, AC 61–58.
Flight Instructor Airplane Written Test Guide, AC 61–72.
Flight Test Guide—Gyroplane, Private and Commercial, AC 61–30.
Flight Test Guide—Helicopter, Private and Commercial Pilot, AC 61–25.
Flight Test Guide (Part 61 revised)—Instrument Pilot Airplane, AC 61–56.
Flight Test Guide—Instrument Pilot Helicopter, AC 61–64.
Flight Test Guide (Part 61 revised)—Private Airplane, AC 61–54.
Flight Navigator Written Test Guide, AC 63–2
Flight Training Handbook, AC 61–21.
Forming and Operating a Flying Club, AC 00–25.
General Aviation Inspection Aids, Summary, AC 20–7.
Ground Instructor—Instrument—Written Test Guide, AC 143–2.
Ground Instructor Written Test Guide—Basic and Advanced, AC 143–1.

Guide to Drug Hazards in Aviation Medicine, AC 91.11-1.
Heliport Design Guide, AC 150/5390-1.
Instrument Flying Handbook, AC 61-27.
Instrument Rating (Airplane) Written Test Guide, AC 61-8.
Inspection Authorization Study Guide, AC 65-19.
Medical Handbook for Pilots, AC 67-2.
Multiengine Airplane Class and Type Rating, AC 61-57.
Nondestructive Testing in Aircraft, AC 43-3.
Parachute Rigger Certification Guide, AC 65-5.
Personal Aircraft Inspection Handbook, AC 20-9.
Pilot Transition Courses for Complex Single-engine and Light, Twin-engine Airplanes, AC 61-9.
Pilot's Handbook of Aeronautical Knowledge, AC 61-23.
Pilot's Weight and Balance Handbook, AC 91-23.
Planning the Metropolitan Airport System, AC 150/5070-5.
Planning the State Airport System, AC 150/5050-3.
Private and Commercial Pilot, Flight Test Guide, AC 61-59.
Private and Commercial Pilot Glider, Flight Test Guide, AC 61-61.
Private and Commercial Pilot Gyroplane, Flight Test Guide, AC 61-60.
Private and Commercial Pilots Refresher Courses, AC 61-10.
Private and Commercial Pilot—Rotorcraft/Helicopter—Written Test Guide, AC 61-73.
Private Pilot (Airplane) Flight Training Guide, AC 61-2.
Private Pilot Written Test Guide, AC 61-32.
Standards for Specifying Construction of Airports, AC 150/5370-10.
Student Pilot Guide, AC 61-12.
Terrain Flying, AC 91-15.
Ultrasonic Nondestructive Testing for Aircraft, AC 43-7.
U.S. Civil Aircraft Register, AC 20-6.
Written Test Guide, Flight Instructor—Glider, AC 61-75.
Written Test Guide, Flight Instructor—Rotorcraft-Helicopter, AC 61-74.
Written Test Guide—Airplane—Flight Instructor, AC 61-72.
Written Test Guide—Airplane—Commercial Pilot, AC 61-71.

## Internal Publications

**Contractions Handbook, 7340.1E (10-1-75).**

Gives approved word and phrase contractions used by personnel connected with air traffic control, communications, weather, charting, and associated services. (Sub. $18.00-$23.00 foreign—Supt. Docs.) TD 4.308:C76/975.

**Location Identifiers, 7350.4L (1-26-78).**

Incorporates all authorized 3-letter location identifiers for special use in United States, worldwide, and Canadian assignments. (Sub. $18.00—$23.00 foreign—Supt. Docs.) TD 4.310:.

**Air Traffic Control Handbook, 7110.65A (1-1-78).**

Prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services. Controllers are required to be familiar with the provisions of this handbook which pertain to their operational responsibility and to exercise their best judgment if they encounter situations not covered by it. (Sub. $16.00—$20.00 foreign—Supt. Docs.) TD 4.308 AI 7 3:978.

**Flight Services, 7110.10D (1-1-77).**

This handbook consists of two parts. Part I, the basic, prescribes procedures and phraseology for use by personnel providing flight assistance and communications services. Part II, the teletypewriter portion, includes Services A and B teletypewriter operating procedures, pertinent International Teletypewriter Procedures, and the conterminous U.S. Service A Weather Schedules. (Sub. $18.30—$22.90 foreign—Supt. Docs.) TD 4.308: F 64/977.

**United States Standard for Terminal Instrument Procedures (TERPS), 8260.3B (July 1976).**

Contains criteria which shall be used to formulate, review, approve, and publish procedures for instrument approach and departure of aircraft to and from civil and military airports. These criteria are for application at any location over which an appropriate U.S. agency exercises jurisdiction. ($2.80 single copy. Supt. Docs.) Changes sold separately as issued.) SN 050-007-00345-5.

**International Flight Information Manual, Vol. 25 (April 1977).**

This Manual is primarily designed as a preflight and planning guide for use by U.S. nonscheduled operators, business and private aviators contemplating flights outside of the United States.

The Manual, which is complemented by the International Notams publication, contains foreign entry requirements, a directory of aerodromes of entry including operational data, and pertinent regulations, and restrictions. It also contains passport, visa, and health requirements for each country. Published annually with quarterly amendments. (Annual Sub. $9.00; $11.25 foreign—Supt. Docs.) TD 4.309:24/976.

**International Notams.**

Covers notices on navigational facilities and information on associated aeronautical data generally classified as "Special Notices." Acts as a notice-to-airmen service only. Published weekly. (Annual Sub. $28.10 domestic—$35.15 foreign—Supt. Docs.) TD4.11:.

**Airman's Information Manual:**

**Part 1—Basic Flight Information and ATC Procedures.**

This part is issued semiannually and contains basic fundamentals required to fly in the U.S. National Airspace System; Among other data it also contains adverse factors affecting Safety of Flight; Health and Medical Facts of interest to pilots; ATC information affecting rules, regulations and procedures; a Pilot/Controller Glossary; Air Defense Identification Zones (ADIZ); Designated Mountainous Areas; and Emergency Procedures. (Annual Sub. $5.00, foreign $6.25. Supt. Docs.) TD 4.12: pt. 1/.

**Part 2—Airport Directory.**

This part is issued semiannually and contains a Directory of all Airports, Seaplane Bases, and Heliports in the conterminous United States, Puerto Rico, and the Virgin Islands which are available for civil use. It includes all of their services, except communications, in codified form. Those airports with communications are also listed in Part 3 which reflects their radio facilities. A list of new and permanently closed airports which updates this part is contained in Part 3. Also included in Part 2 are U.S. Entry and Departure Procedures, including Airports of Entry and Landing Rights Airports; and a listing of Flight Service Station and National Weather Service Telephone Numbers. (Annual Sub. $7, foreign $8.75. Supt. Docs.) TD 4.12: pt. 2/.

**Part 3—Operational Data and Special Notices.**

Part 3 is issued every 56 days and contains an Airport-Facility Directory of all major airports in the conterminous U.S., Peurto Rico, and the Vrigin Islands with control towers and/or instrument landing systems; a tabulation of Air Navigation Radio Aids including Restrictions to En Route Navigation Aids; Special, General, & Area Notices; a tabulation of New and Permanently Closed Airports (which updates Part 2); Locations of VOR Receiver Check Points (both ground and airborne); a tabulation of North Atlantic Routes; Preferred Routes; Area Navigation Routes, and Sectional Chart Bulletins. (Annual subscription $30.50; $38.15 foreign. Supt. Docs.) TD 4.12: pt. 3.

**Part 3A—Notices to Airmen.**

Part 3A is issued every 14 days and contains current Notices to Airmen considered essential to the safety of flight as well as supplemental data to all Parts of AIM. (Annual subscription $20.55; $25.70 foreign. Supt. Docs.) TD 4.12: pt. 3A.

**Part 4—Graphic Notices and Supplemental Data.**

Part 4 is issued quarterly and contains abbreviations used in all parts of AIM; Parachute Jump Areas; Special Notice—Area Graphics; Terminal Area Graphics; Terminal Radar Service Area Graphics; Olive Branch Routes and other data not requiring frequent change. (Annual Sub. $14.40, foreign $18.00. Supt. Docs.) TD 4.12: pt. 4/.

## NOTICE

*The FAA has changed the issuance system for the Aircraft Type Certificate Data Sheets and Specifications and the Aircraft Engine and Propeller Type Certificate Data Sheets and Specifications in an effort to reduce the cost to users. All subscriptions to these two volumes terminated on Dec. 31, 1976.*

*Beginning with the January 1977 editions the two titles will change to a new basic series title—Type Certificate Data Sheets and Specifications—and*

*will be grouped into six volumes with subtitles as follows:*

Vol. I Single-Engine Airplanes.
Vol. II Small Multiengine Airplanes.
Vol. III Large Multiengine Airplanes.
Vol. IV Rotocraft, Gliders, and Balloons.
Vol. V Aircraft Engines and Propellers.
Vol. VI Aircraft Listing and Aircraft Engine Listing.

**Type Certificate Data Sheets and Specifications**

Vol. I Single Engine Airplanes (TCDS 1) (Sub. $38.00, foreign $47.50. Supt. Docs.).
Vol. II Small Multiengine Airplanes (TCDS 2) (Sub. $28.00, foreign $35.00. Supt. Docs.).
Vol. III Large Multiengine Airplanes (TCDS 3) (Sub. $32.00, foreign $40.00. Supt. Docs.).
Vol. IV Rotorcraft, Gliders, and Balloons (TCDS 4) (Sub. $16.50, foreign $20.75. Supt. Docs.).
Vol. V Aircraft Engines and Propellers (TCDS 5) (Sub. $27.00, foreign $33.75. Supt. Docs.).
Vol. VI Aircraft Listing and Aircraft Engine and Propeller Listing (SN 050–007–00360–9) (Single Copy $4.15, foreign $5.20. Supt. Docs.).

Volumes I, II, III, IV, and V will be sold on a subscription basis and monthly supplementary service is included in the sales price.

Volume VI .will be sold on a single-sales basis and will be issued as a revised edition when sufficient changes warrant.

**Summary of Supplemental Type Certificates, January 1976.**

Contains all supplemental type certificates issued by FAA regarding design changes in aircraft, engines, or propellers. List includes description of change, the model and type certificate number, the supplemental type certificate number, and the holder of the change. Quarterly supplements provided. ($43.00—Sub., foreign $54.00. Supt. Docs.) TD 4.36:976.

## NOTICE

The January 1976 issues of the Summary of Airworthiness Directives—Volumes I and II, will be sold and distributed for the Superintendent of Documents by the Federal Aviation Administration from Oklahoma City, Oklahoma. Requests for subscriptions to either of these publications should be sent to:

U.S. Department of Transportation, Federal Aviation Administration, P.O. Box 25461, Attn: ACC–23, Oklahoma City, Okla. 73125.

Subscription service will consist of the summary and automatic biweekly updates to each summary for a 2-year period. Make certified checks or money orders payable to Federal Aviation Administration.

**Summary of Airworthiness Directives for Small Aircraft (1–1–76) Volume I.**

Presents, in volume form, all the Airworthiness Directives for small aircraft issued through December 31, 1975. AD's for engines, propeller, and equipment are included in each volume. Each volume is arranged alphabetically by product manufacturer. ($14.00 plus $3.50 additional for foreign handling.) SN 050–007–00306–4.

**Summary of Airworthiness Directives for Large Aircraft (1–1–76) Volume II.**

Presents, in volume form, all the Airworthiness Directives for large aircraft (over 12,500 pounds maximum certificated takeoff weight) issued through December 31, 1975. AD's for engines, propellers, and equipment are included in each volume. ($13.00 plus $3.25 additional for foreign handling.) SN 050–007–00307–2.

## STATUS OF THE FEDERAL AVIATION REGULATION AS OF NOVEMBER 15, 1977

The FAA publishes the Federal Aviation Regulations to make readily available to the aviation community the regulatory requirements placed upon them. These Regulations are sold as individual Parts by the Superintendent of Documents.

The more frequently amended Parts are sold on subscription service (that is, subscribers will receive Changes automatically as issued), while the less active Parts are sold on a single-sale basis. Changes to single-sale Parts will be sold separately as issued. Information concerning these Changes will be furnished by FAA through its "Status of the Federal Aviation Regulations, AC 00–44." Instructions for ordering this free status list are given in the front of each single-sale Part.

### NOTE

*The Special Federal Aviation Regulations (SFAR) which are presently in effect are now being included in their related FAR Part.*

The following list indicates the breakdown of the single-sale Parts and the subscription Parts. Check or money order made payable to the Superintendent of Documents should be included with each order. Submit orders for single-sales and subscription Parts on different order forms. No COD orders are accepted. All FAR Parts should be ordered from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

*Parts sold on subscription service*

| Part | Title | Publication date | Catalog No. | Price: Domestic | Price: Additional for foreign handling | Price: Changes issued to date |
|---|---|---|---|---|---|---|
| 1 | Definitions and Abbreviations | June 1974 | TD 4.6:1 | $3.00 | $0.75 | 5 |
| 21 | Certification Procedures for Products and Parts. | May 1974 | TD 4.6:21 | 3.75 | .95 | 8 |
| 23 | Airworthiness Standards: Normal, Utility, and Acrobatic Category Airplanes. | June 1974 | TD 4.6:23 | 3.55 | .90 | 7 |
| 25 | Airworthiness Standards: Transport Category Airplanes. | do | TD 4.6:25 | 6.60 | 1.65 | 6 |
| 33 | Airworthiness Standards: Aircraft Engines. | August 1974 | TD 4.6:33 | 3.00 | .75 | 3 |
| 36 | Noise Standards: Aircraft Type and Airworthiness Certification. | June 1974 | TD 4.6:36 | 3.00 | .75 | 7 |
| 37 | Technical Standard Order Authorizations. | May 1974 | TD 4.6:37 | 5.65 | 1.45 | 6 |
| 63 | Certification: Flight Crewmembers Other Than Pilots. | September 1974 | TD 4.6:63 | 3.00 | .75 | 2 |
| 91 | General Operating and Flight Rules | March 1974 | TD 4.6:91 | 11.30 | 2.85 | 22 |
| 93 | Special Air Traffic Rules and Airport Traffic Patterns. | do | TD 4.6:93 | 2.45 | .65 | 5 |
| [1] 103 | Part Revoked as July 1, 1976. | | | | | |
| 121 | Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft. | April 1974 | TD 4.6:121 | 19.00 | 4.75 | 25 |
| 123 | Certification and Operations: Air Travel Clubs Using Large Airplanes. | do | TD 4.6:123 | 2.00 | .50 | 4 |
| 139 | Certification and Operations: Land Airports Serving CAB-Certificated Scheduled Air Carriers Operating Large Aircraft (Other Than Helicopters). | December 1974 | TD 4.6:139 | 3.00 | .75 | 4 |

[1] The regulations for the transportation of hazardous material by air is set forth in Part 175—Carriage by Aircraft, effective July 1, 1976, published in 41 FR 16106, April 15, 1976. This part is issued by the Materials Transportation Bureau, Department of Transportation. For information concerning hazardous material regulations, contact the Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590.

*Parts sold on single-sales basis*

| Part | Title | Publication Date | Stock Number | Price [1] |
|---|---|---|---|---|
| 11 | General Rule-Making Procedures | May 1974 | SN 050–007–00236–0 | $1.30 |
| | Change 1 | Feb. 1, 1974 | SN 050–007–00286–6 | .45 |
| | | Jan. 1, 1975 | | |
| | Change 2 | Mar. 18, 1976 | SN 050–007–00325–1 | .40 |
| | Change 3 | Jan. 1, 1976 | SN 050–007–00340–4 | .40 |
| | Change 4 | Sept. 6, 1977 | SN 050–007–00390–1 | .80 |
| 13 | Enforcement Procedures | May 1974 | SN 050–007–00230–1 | .70 |
| | Change 1 | Aug. 2, 1976 | SN 050–007–00334–0 | .40 |
| | Change 2 | Dec. 13, 1976 | SN 050–007–00357–9 | .40 |
| 27 | Airworthiness Standards: Normal Category Rotorcraft. | August 1974 | SN 050–007–00244–1 | 2.10 |
| | Change 1 | Oct. 31, 1974 | SN 050–007–00255–6 | .75 |
| | Change 2 | Feb. 5, 1976 | SN 050–007–00309–9 | .35 |
| | Change 3 | Feb. 1, 1977 | SN 050–007–00362–5 | 1.30 |
| | Change 4 | May 2, 1977 | SN 500–007–00370–6 | 1.40 |
| | Change 5 | Sept. 1, 1977 | SN 050–007–00393–5 | 1.40 |

| Part | Title | Publication Date | Stock Number | Price [1] |
|---|---|---|---|---|
| 29 | Airworthiness Standards: Transport Category Rotorcraft. | August 1974 | SN 050-007-00245-9 | 1.70 |
| | Chagne 1 | Oct. 31, 1974 | SN 050-007-00256-4 | .70 |
| | Change 2 | Feb. 5, 1976 | SN 050-007-00310-2 | .35 |
| | Change 3 | Jan. 14, 1975 | SN 050-007-00351-0 | .40 |
| | | Dec. 31, 1975 | | |
| | Change 4 | Feb. 1, 1977 | SN 050-007-00367-6 | 1.45 |
| | Change 5 | May 2, 1977 | SN 050-007-00371-4 | 1.60 |
| | Change 6 | Sept. 1, 1977 | SN 050-007-00394-3 | 1.40 |
| 31 | Airworthiness Standards: Manned Free Balloons | August 1974 | SN 050-007-00246-7 | .40 |
| | Change 1 | Feb. 1, 1977 | SN 050-007-00361-7 | .65 |
| 35 | Airworthiness Standards: Propellers | August 1974 | SN 050-007-00247-5 | .35 |
| | Change 1 | Feb. 1, 1977 | SN 050-007-00363-3 | .65 |
| | Change 2 | May 2, 1977 | SN 050-007-00369-2 | 1.10 |
| 39 | Airworthiness Directives [2] | May 1974 | SN 050-007-00229-7 | .35 |
| 43 | Maintenance, Preventive Maintenance, Rebuilding and Alteration. | January 1974 | SN 050-007-00311-1 | 1.80 |
| 45 | Identification and Registration Marking | May 1974 | SN 050-07-00231-9 | .65 |
| | Change 1 | Sept. 14, 1977 | SN 050-007-0395-1 | .80 |
| 47 | Aircraft Registration | May 1974 | SN 050-007-000312-9 | .85 |
| | Change 1 | Sept. 8, 1976 | SN 050-007-00335-8 | .40 |
| 49 | Recording of Aircraft Titles and Security Documents. | May 1974 | SN 050-007-00232-7 | .50 |
| | Change 1 | Sept. 8, 1976 | SN 050-007-00336-6 | .40 |
| 61 | Certification: Pilots and Flight Instructors | November 1974 | SN 050-007-00313-7 | 2.90 |
| | Change 1 | Dec. 22, 1976 | SN 050-007-00353-6 | .50 |
| | Change 2 | May 9, 1977 | SN 050-007-00372-2 | .80 |
| 65 | Certification: Airmen Other Than Flight Crewmembers. | September 1974 | SN 050-007-00314-5 | 1.25 |
| | Change 1 | Oct. 17, 1977 | SN 050-007-00399-4 | .80 |
| 67 | Medical Standards and Certification | September 1974 | SN 050-007-00248-3 | .50 |
| | Change 1 | Dec. 21, 1976 | SN 050-007-00341-2 | .40 |
| 71 | Designation of Federal Airways, Area Low Routes, Controlled Airspace, and Reporting Points.[3] | January 1975 | SN 050-007-00273-4 | .85 |
| | Change 1 | July 28, 1975 | SN 050-007-00290-4 | .35 |
| 73 | Special Use Airspace [3] | January 1975 | SN 050-007-00274-2 | .40 |
| | Change 1 | July 28, 1975 | SN 050-007-00291-2 | .35 |
| 75 | Establishment of Jet Routes and Area High Routes.[3] | January 1975 | SN 050-007-00275-1 | .40 |
| | Change 1 | Apr. 26, 1976 | SN 050-007-00326-9 | .40 |
| 77 | Objects Affecting Navigable Airspace | January 1975 | SN 050-007-00276-9 | 1.10 |
| 95 | IFR Altitudes [3] | do | SN 050-007-00277-7 | .50 |
| | Change 1 | Feb. 13, 1975 | SN 050-007-00285-8 | .35 |
| 97 | Standard Instrument Approach Procedures [4] | January 1975 | SN 050-007-00278-5 | .45 |
| 99 | Security Control of Air Traffic | March 1974 | SN 050-007-00224-6 | .70 |
| | Change 1 | Mar. 11, 1976 | SN 050-007-00324-2 | .40 |
| 101 | Moored Balloons, Kites, Unmanned Rockets, and Unmanned Free Balloons. | March 1974 | SN 050-007-00223-8 | .65 |
| | Change 1 | Aug. 20, 1974 | SN 050-007-00242-4 | .50 |
| 105 | Parachute Jumping | March 1974 | SN 050-007-00315-3 | .55 |
| | Change 1 | Nov. 29, 1976 | SN 050-007-00344-7 | .40 |
| 107 | Airport Security | March 1974 | SN 050-007-00225-4 | .40 |
| | Change 1 | Dec. 9, 1976 | SN 050-007-00346-1 | .40 |
| 127 | Certification and Operations of Scheduled Air Carriers with Helicopters. | April 1974 | SN 050-007-00316-1 | 1.80 |
| | Change 1 | Sept. 14, 1974 | SN 050-007-00317-0 | .35 |
| | Change 2 | Feb. 1, 1977 | SN 050-007-00364-1 | .65 |
| 129 | Operations of Foreign Air Carriers | April 1974 | SN 050-007-00228-9 | .45 |
| | Change 1 | Oct. 9, 1975 | SN 050-007-00293-9 | .35 |
| | Change 2 | Aug. 23, 1976 | SN 050-007-00333-1 | .40 |
| | Change 3 | Nov. 29, 1976 | SN 050-007-00347-1 | .35 |
| 133 | Rotorcraft External-Load Operations | November 1974 | SN 050-007-00318-8 | .55 |
| | Change 1 | Feb. 1, 1977 | SN 050-007-00365-0 | .65 |
| | Change 2 | Aug. 10, 1977 | SN 050-007-00380-3 | .90 |
| | Change 3 | June 25, 1977 | SN 050-007-00389-7 | .90 |
| 135 | Air Taxi Operations and Commercial Operators of Small Aircraft. | November 1974 | SN 050-007-00319-6 | 2.50 |
| | Change 1 | Nov. 15, 1974 | SN 050-007-00320-0 | .35 |
| | | Dec. 9, 1974 | | |
| | Change 2 | May 15, 1975 | SN 050-007-00321-8 | .35 |
| | Change 3 | Nov. 29, 1976 | SN 050-007-00346-3 | .45 |
| | Change 4 | Feb. 1, 1977 | SN 050-007-00366-8 | .65 |
| | Change 5 | May 16, 1977 | SN 050-007-00374-9 | .90 |
| | Change 6 | Dec. 24, 1965 | SN 050-007-00378-1 | 1.50 |
| | | Jan. 1, 1977 | | |
| | | Dec. 22, 1976 | | |
| | Change 7 | Sept. 21, 1977 | SN 050-007-00397-8 | .70 |
| 137 | Agricultural Aircraft Operations | November 1974 | SN 050-007-00258-1 | .50 |
| | Change 1 | May 24, 1976 | SN 050-007-00327-7 | .35 |
| | Change 2 | Sept. 20, 1976 | SN 050-007-00337-4 | .40 |
| 141 | Pilot Schools | November 1974 | SN 050-007-00322-6 | 1.15 |
| 143 | Gound Instructors | September 1974 | SN 050-007-00249-1 | .45 |
| 145 | Repair Stations | January 1974 | SN 050-007-00220-3 | .85 |
| | Change 1 | Nov. 29, 1976 | SN 050-007-00349-8 | .40 |
| 147 | Aviation Maintenance Technician Schools | September 1974 | SN 050-007-00250-5 | .65 |
| | Change 1 | Nov. 29, 1976 | SN 050-007-00350-1 | .40 |
| 149 | Parachute Lofts | January 1974 | SN 050-007-00221-1 | .50 |
| 151 | Federal Aid to Airports | December 1974 | SN 050-007-00261-1 | 1.55 |
| 152 | Airport Aid Program | do | SN 050-007-00323-4 | 1.35 |
| | Change 1 | Sept. 26, 1976 | SN 050-007-00338-2 | .40 |
| | Change 2 | Oct. 21, 1976 | SN 050-007-00342-1 | .45 |
| | Change 3 | June 27, 1977 | SN 050-007-00387-1 | .70 |
| | Change 4 | Aug. 25, 1977 | SN 050-007-00396-0 | .90 |
| 153 | Acquisition of U.S. Land for Public Airports | December 1974 | SN 050-007-00262-9 | .50 |
| 154 | Acquisition of U.S. Land for Public Airports Under the Airports and Airway Act of 1970. | do | SN 050-007-00269-6 | .40 |
| | Change 1 | June 27, 1977 | SN 050-007-00388-9 | .70 |
| 155 | Release of Airport Property from Surplus Property Disposal Restrictions. | December 1974 | SN 050-007-00270-0 | .40 |
| 157 | Notice of Construction, Alteration, Activation, and Deactivation of Airports. | January 1975 | SN 050-007-00279-3 | .40 |
| 159 | National Capital Airports | December 1974 | SN 050-007-00268-8 | 1.00 |
| | Change 1 | June 13, 1976 | SN 050-007-00330-7 | .35 |

See footnotes at end of table.

| Part | Title | Publication Date | Stock Number | Price [1] |
|---|---|---|---|---|
| 169 | Expenditure of Federal Funds for Nonmilitary Airports on Air Navigational Facilities Thereon. | January 1975 | SN 050-007-00280-7 | .35 |
| 171 | Non-Federal Navigation Facilities | do | SN 050-007-00281-5 | 1.10 |
| | Change 1 | Aug. 19, 1975 | SN 050-007-00297-1 | .65 |
| 183 | Representatives of the Administrator | May 1974 | SN 050-007-00233-5 | .45 |
| | Change 1 | Jan. 9, 1976 | SN 050-007-00352-8 | .35 |
| | Change 2 | Aug. 30, 1977 | SN 050-007-00398-6 | .70 |
| 185 | Testimony by Employees and Production of Records in Legal Proceedings and Service of Legal Process and Pleadings. | May 1974 | SN 050-007-00237-8 | .80 |
| 187 | Fees | do | SN 050-007-00234-3 | .40 |
| 189 | Use of Federal Aviation Administration Communication System. | do | SN 050-007-00235-1 | .40 |
| 191 | Withholding Security Information From Disclosure Under the Air Transportation Security Act of 1974. | November 1976 | SN 050-007-00359-5 | .40 |

[1] Add 25% for foreign handling.

[2] Due to their length, complexity, and frequency of issuance, individual Airworthiness Directives are published separately in the FEDERAL REGISTER. Copies of Airworthiness Directives that have been issued are for sale in summary form by DOT, FAA Aeronautical Center (Consigned agent for Superintendent of Documents), P.O. Box 25461, Oklahoma City, Okla. 73125, Attn: AAC-23.

[3] Due to their length, complexity, and frequency of issuance, individual airspace designations, airways descriptions, restricted areas, jet route descriptions, and en route IFR altitudes are not included in the publication of these basic parts. Such descriptions are published in the FEDERAL REGISTER and depicted on appropriate aeronautical charts. Aeronautical charts can be obtained from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Distribution Division (C-44), National Ocean Survey, Riverdale, Md. 20840.

[4] Standard instrument approach procedures are published in the FEDERAL REGISTER by reference to FAA documents which are available for examination in the Rules Docket (AGC-24) and the National Flight Data Center, FAA Headquarters, Washington, D.C., and at the appropriate FAA Regional Offices and Flight Inspection District Offices. These approach procedures can be obtained from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Distribution Division (C-44), National Ocean Survey, Riverdale, Md. 20840.

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